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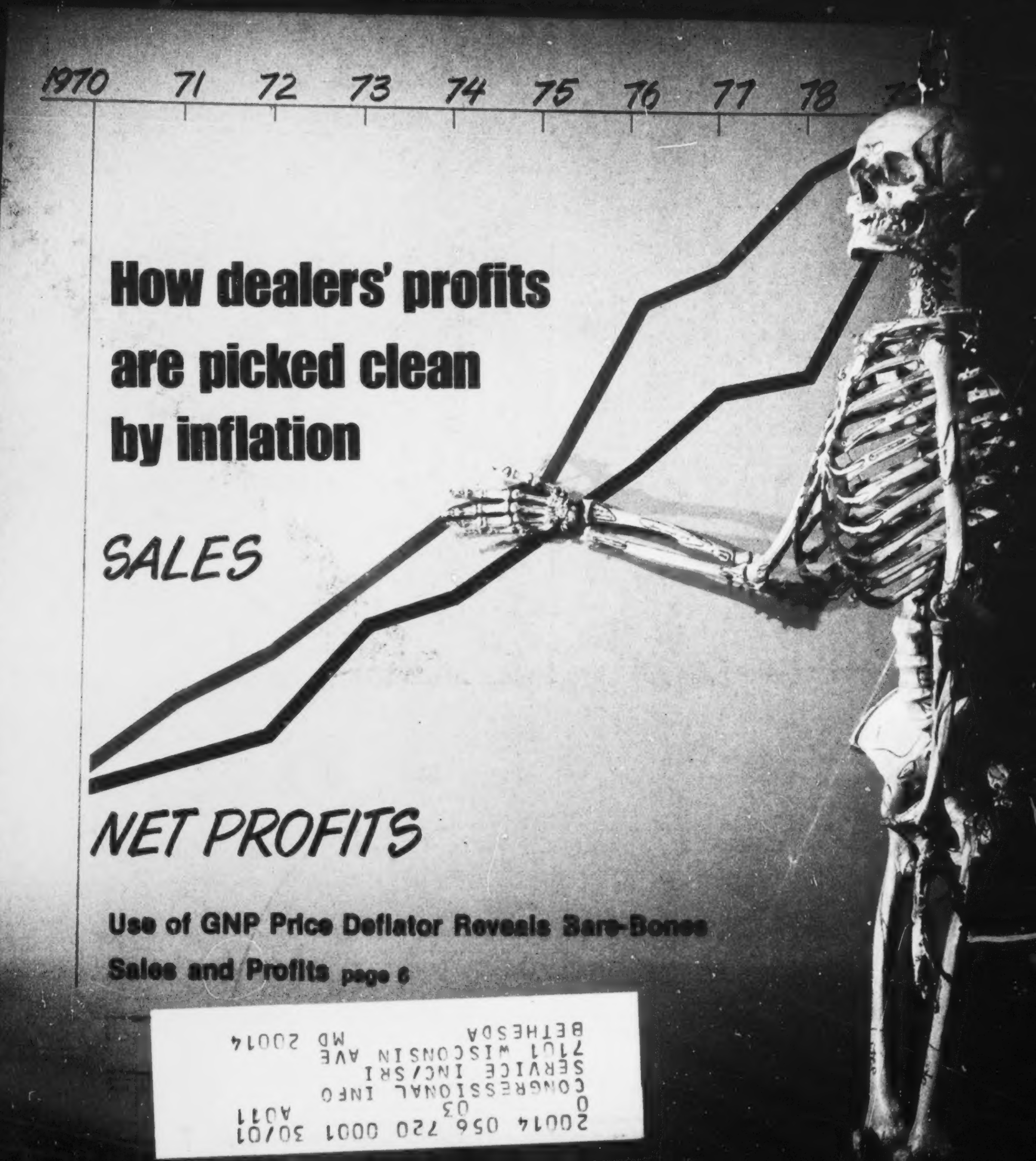
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SALES
NET PROFITS

How dealers' profits are picked clean by inflation

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Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

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6: How Dealers' Profits Are Picked Clean by Inflation. Sales figures during the 'seventies showed consistent and dramatic increases, but adjustment of those figures for inflation reveals what really occurred.

10: Re-Refined Oil: A Slick Solution? Re-refining the millions of gallons of oil used on farms each year offers solutions to environmental problems and conservation of resources, but how do tractor/engine manufacturers feel about its use?

16: Four New Tractors. Kubota's new L305, 30-hp tractor; IH's 884 model 4-cylinder diesel and 4WD model 3788; and MF's 4WD top-of-the-line MF 4900 offer new features and options to meet the needs of today's farming operations.

20: Search Continues for Ways to Lessen Soybean Harvest Losses. Researchers test two modified soybean cutting devices in the quest to reduce soybean crop losses estimated to be 9 to 10 per cent of potential yield.

On the cover.....
No Halloween scare here as dealers realize volume sales don't mean "obscene profits" in inflationary times. For a look at how to measure sales and profits against inflation, see page 6.

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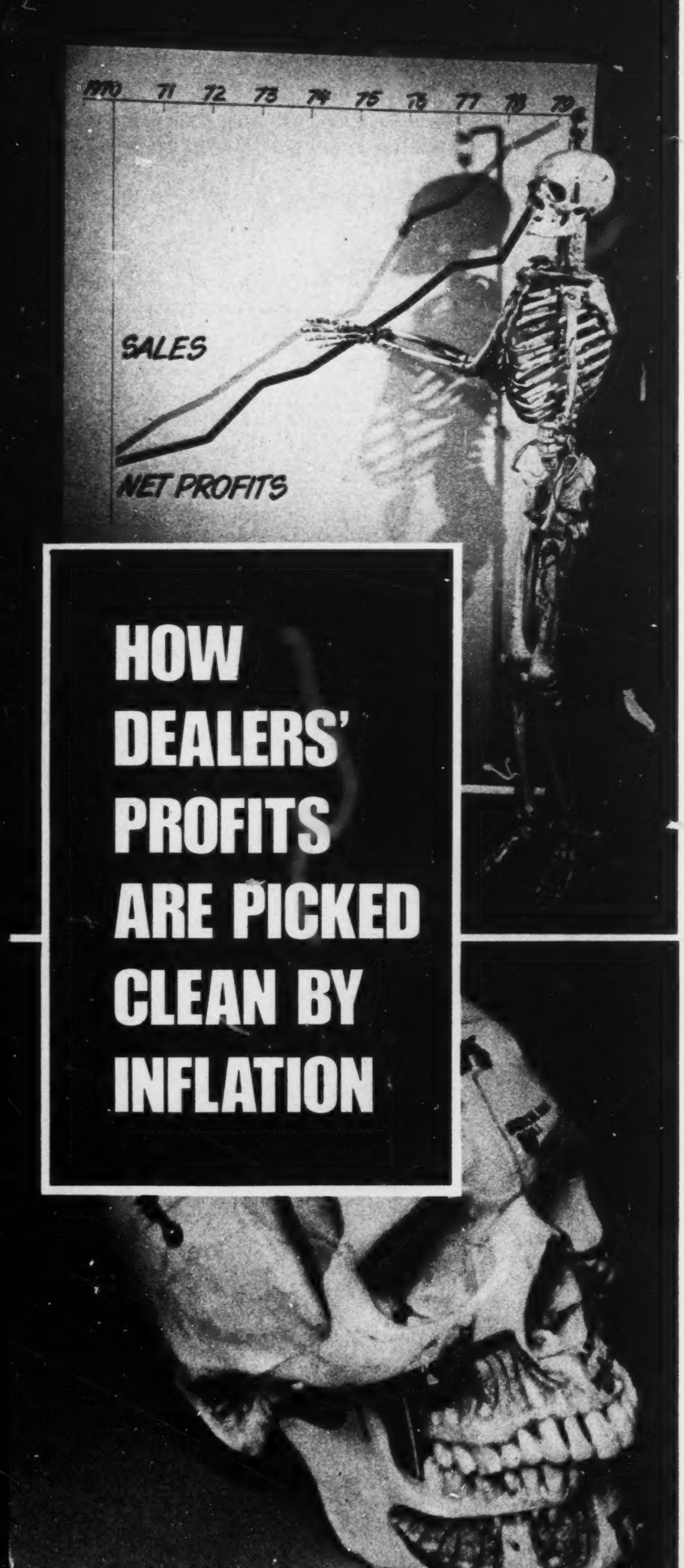


HOW DEALERS' PROFITS ARE PICKED CLEAN BY INFLATION

Bare-bones sales and profits during the 'seventies revealed by using GNP price deflator. First of two articles examines the effects of inflation on retail farm equipment dealers.

By Donald V. Koenig

The author, former executive vice-president of the National Farm & Power Equipment Dealers Assn., is a marketing consultant and business broker.

■ONE OF the side effects of inflation has been the distortion or seeming elimination of the typical business cycle associated with the retail farm equipment industry. This becomes readily apparent from the annual "All Dealer" averages reported in the NFPEDA Cost of Doing Business Study.

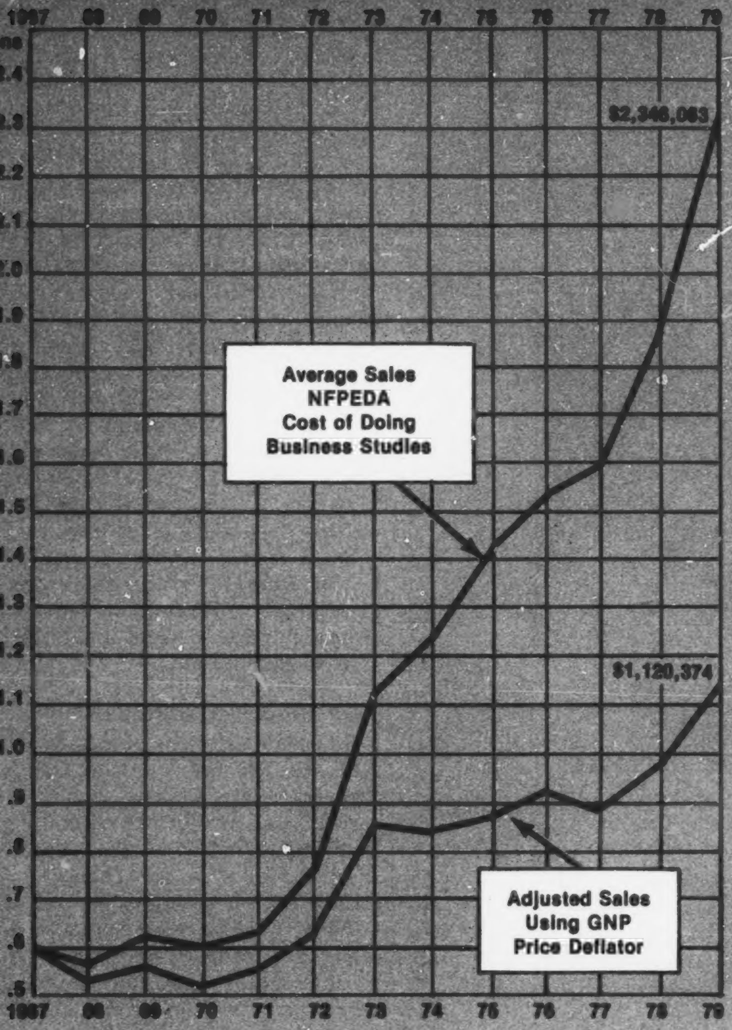
In the period 1970 to 1979 annual sales have increased consistently and dramatically each year from $591,611 in 1970 to $2,346,063 in 1979. In no year of the past decade did annual sales dip below those of the previous year.

However, adjusting these figures to compensate for inflation shows there were two years in which sales actually dropped in terms of "real" dollars and for half of the decade, sales were much flatter than the "raw" dollar figures tend to indicate.

Chart I shows the average annual sales for all reporting dealers in the NFPEDA Cost of Doing Business Studies. It also shows those same sales figures adjusted for inflation. Compare the adjusted sales declines in 1974 and 1977 with the continual increases in CDBS "unadjusted" figures. While the unadjusted dollar figures indicate a sales increase of 297 per cent for the decade, the constant dollar figures show a much lesser increase of only 119 per cent.

A comparison of the 1979 actual sales of $2,346,063 with adjusted sales of $1,120,347 indicates that about half of dealers' current volume of business is inflation. Putting it another way, the 1979 dollar is worth only 50 cents.

I: Average dealer sales – Raw Dollars and Real Dollars



Annual NFPEDA Study Measures Industry

For more than 50 years the National Farm & Power Equipment Dealers Assn. has been compiling dealer financial and operating averages. The scope and methodology of this project, known as the annual Cost of Doing Business Study, have been refined over the years.

While some manufacturers compile similar data on their own dealers, the CDBS is the only industry-wide statistical compilation of operating averages involving dealers of all lines of equipment and the only compilation of such data that is made public.

Critics of the Cost of Doing Business Study say the figures are distorted toward larger, more successful dealers who maintain detailed accounting systems. They point out the figures do not include dealers who have failed or who cannot provide input data in the required format. Accounting variations among dealers also present problems in compiling the CDBS.

Regardless of the validity of these charges, the NFPEDA Cost of Doing Business Study remains a most valuable tool for measuring dealer performance and traces the history of dealer operations over the past half century.

Dealers who wish to adjust their own financial figures in terms of inflation may easily do so by means of the Gross National Product Price Deflator which uses 1967 as its base year. On Chart I we carried the actual and adjusted sales figures back to 1967 to show how they gradually diverge from a common starting point. To use the GNP price deflator divide your figures for each year by the GNP deflator figure for that same year:

Year	GNP price deflator
1970	1.156
1971	1.215
1972	1.266
1973	1.339
1974	1.468
1975	1.609
1976	1.692
1977	1.793
1978	1.924
1979	2.094

Thus, if a dealer who had sales in 1979 of $2,400,000 were to divide his results by 2.094, the GNP deflator for that year, he would get $1,146,100—a more realistic number to measure against his 1967 sales to estimate growth of volume.

Deflating profits

Most businessmen regard sales as merely a means to an end. Since the name of the game is profit, how did the decade of the seventies stack up in terms of dealer bottom line profits?

Chart II shows average dealer net operating profit (before income taxes) in both real and actual dollars. Again, we have traced back to 1967 to show the common starting point and how the actual and real dollar figures steadily grow wider apart. Note how the adjusted dollar profits rise more slowly and drop more sharply than the unadjusted figures. Note, too, the decline in real dollar profits in 1971 and 1975 while unadjusted profits show upward movements in both years.

(More...)

Dealers' Profits

(continued)

Seemingly, the decade ended with top profits of $86,190 recorded in 1979. When adjusted for inflation, however, that figure drops to $41,160. On a constant dollar basis 1973, 1974 and 1975 topped the decade's profit parade.

A third way of looking at the decade of the seventies is to review gross margins, expenses and net profits. Chart III shows these key indicators as they rise and fall through the 10-year span. On all counts, the lush years of 1973, 1974 and 1975 with high levels of foreign grain sales dominate the decade. Gross margins of 19.58 per cent combined with net profits of 5.97 per cent yielded a "real" dollar net operating profit of $50,580 in 1974—the highest reported in *the last three decades.*

Small wonder the current embargo on Russian grain sales has generated so much opposition among farmers, dealers and other agri-business people.

How about net worth?

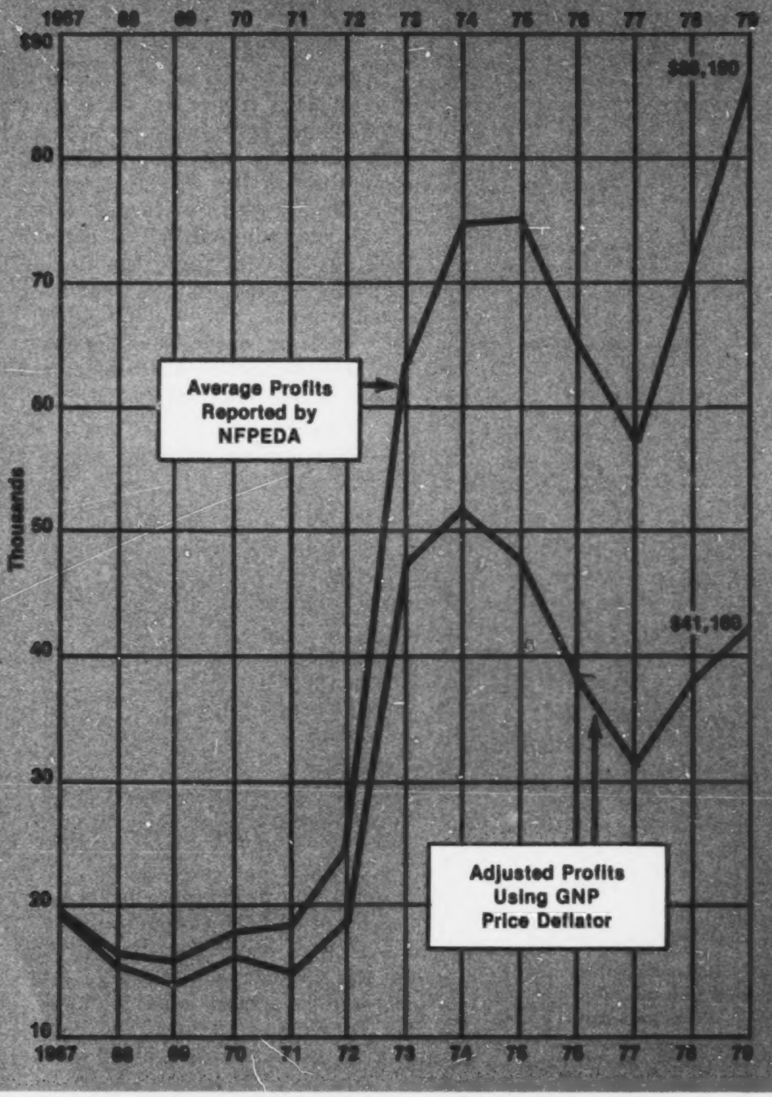
So far in our review of the '70s as seen through the Cost of Doing Business Study we have looked at various elements of the operating statement. What about the balance sheet? Chart IV shows changes in dealers' net worth during the period 1970 to 1979 in both actual and adjusted dollars. By-and-large, net worth correlates with the previous charts on sales and profits except for 1977. In that year, on the basis of adjusted dollars, both sales and profits dropped while net worth rose to its highest level of the decade.

A comparison of 1970 to 1979 readings for sales, profits and net worth, using both actual and adjusted dollars, shows the following percentage increases:

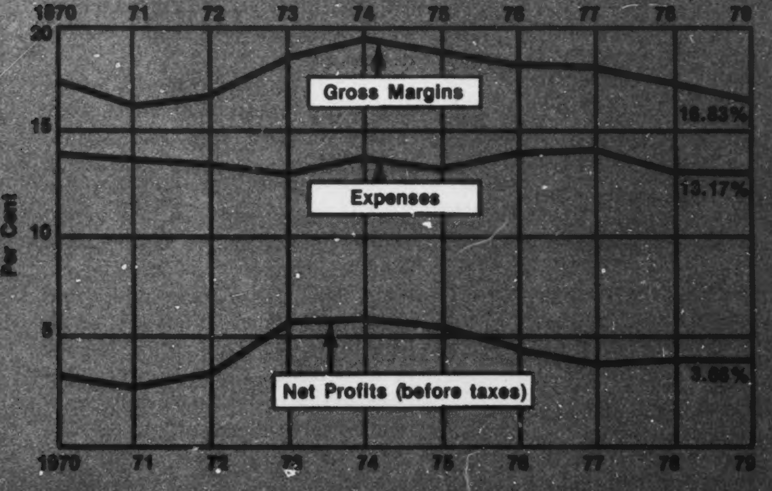
Per cent of Increase

	Actual	Adjusted
Sales	297	119
Net Profits	376	163
Net Worth	185	57

II: Net Operating Profits



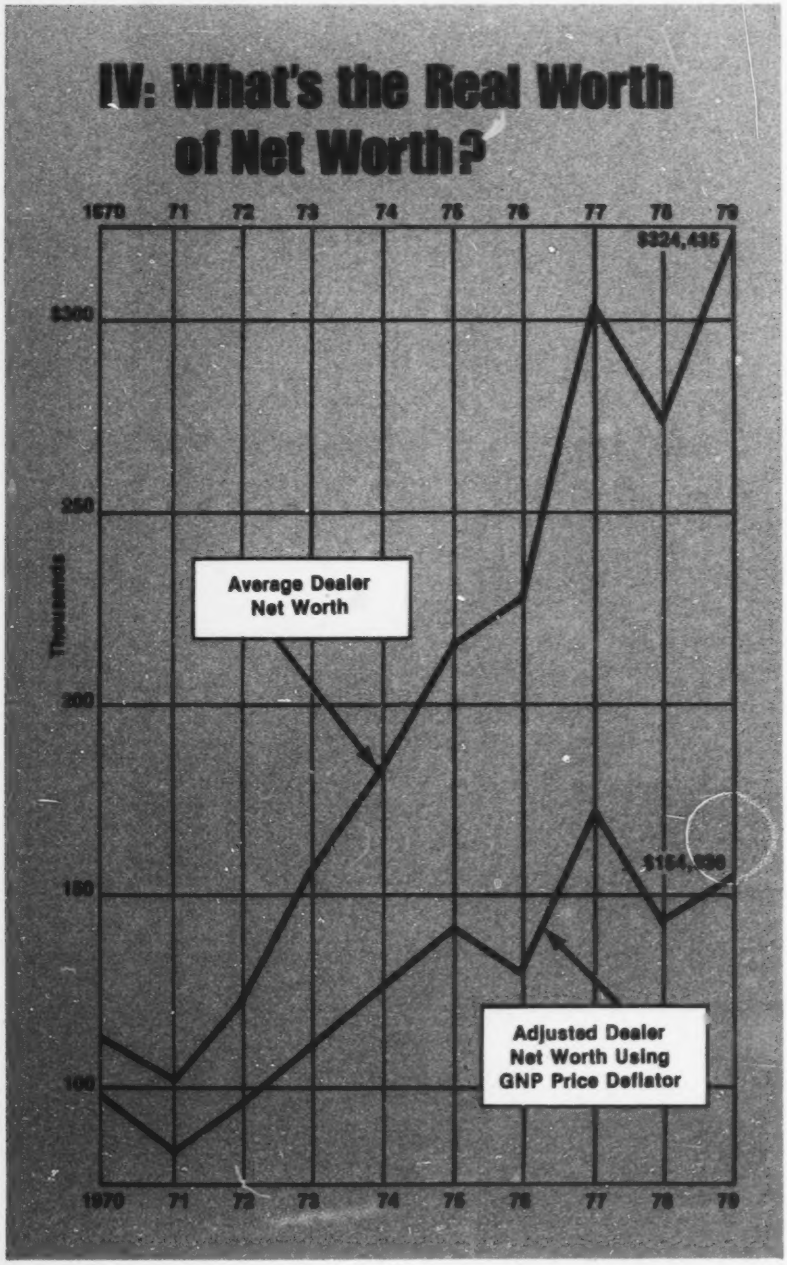
III: Margins, Expenses, Profits



Interestingly, net profits show the highest percentage increase during the decade. Prior to our completion of this study we would have assumed that sales recorded the greatest percentage increase. We were pleasantly surprised to see dealer profits leading the way.

The comparatively dismal showing of the net worth figures gives pause for concern and may well be a source of potential trouble for the retail segment of the industry—particularly in view of any extended periods of hard times such as some dealers are currently experiencing because of weather and economc conditions.

In Part II of this series we will look more closely at net worth, ownership equity, turnover and other significant areas of dealer performance during the 'seventies. ☐



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AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

YODER & FREY, INC.
Archbold, Ohio
(September 9, 1980)

ALLIS-CHALMERS TRACTORS

190, 1969 (Fair)	3000
XT190, 1969 (Rough)	2250*
190, 1968 (Fair)	3700*
180 diesel, 1970 (Rough)	4400*
180, 1969 (Fair)	3500
D14, 1964 (Fair)	1000
WD45, 1954 (Fair)	580*
WD, 1954 (Rough)	350*

DAVID BROWN TRACTORS

950, 1954 (Rough)	800
990, 1970 (Fair)	2300*
990, 1969 (Fair)	1850
885 diesel, 1976 (Good)	4600*

CASE TRACTORS

500, 1963 (Rough)	1100*
430, 1963 (Fair)	2300
400, 1955 (Fair)	975
VAC, 1952 (Fair)	480
VAC, 1947 (Fair)	400*

JOHN DEERE TRACTORS

4520 diesel, 1969 (Good)	8700*
4440 diesel, 1978 (Excellent)	24,250*
4230 diesel, 1975 (Excellent)	11,300
4020 diesel, 1968 (Good)	6800
4020 diesel, 1967 (Fair)	6025
4020, 1966 (Fair)	4000*
4020, 1965 (Fair)	3900
4010 diesel, 1964 (Fair)	5300
4010, 1962 (Good)	4600*
3020 diesel, 1968 (Good)	5450*
3020, 1967 (Good)	4000
3020, 1966 (Good)	5200*
3020, 1965 (Good)	3500
3010 diesel, 1963 (Fair)	2950*
3010, 1962 (Fair)	2800*
2510, 1967 (Fair)	3050*
2010 diesel, 1962 (Rough)	1800*
1830, 1976 (Fair)	5100*
830 diesel, 1960 (Good)	2500
830 diesel, 1960 (Fair)	2350
720, 1958 (Fair)	1900*
620, 1956 (Fair)	1200*
530, 1960 (Good)	2050
520, 1957 (Fair)	1450*
R, 1952 (Fair)	1170
70, 1954 (Fair)	1200*
70 diesel, 1953 (Good)	1500
A, 1948 (Fair)	400
A, 1948 (Rough)	350
40, 1953 (Fair)	1150*

FORD TRACTORS

8000 diesel, 1970 (Fair)	5350
5000, 1977 (Fair)	4750
5000, 1974 (Good)	4700
5000 diesel, 1971 (Fair)	4000
4000, 1972 (Fair)	4500
4000, ldr., 1970 (Fair)	4200*
4000, 1960 (Good)	1800*
3400, ldr., 1968 (Fair)	4000
2000, 1960 (Fair)	2300
961, ldr., 1956 (Fair)	1625
900, ldr., 1956 (Fair)	1800
800, 1955 (Fair)	1050
541, 1957 (Fair)	1400*
Maj., 1956 (Fair)	1700*
NAA, 1954 (Rough)	1400
8N, 1952 (Good)	1450
8N, 1950 (Fair)	1185
8N, 1950 (Fair)	1125
8N, 1950 (Rough)	1000*
8N, plow, 1943 (Fair)	1000*
8N, (Rough)	575
8N, 1951 (Good)	1360
9N, 1945 (Fair)	1000
9N, ldr., 1944 (Rough)	750*

INTERNATIONAL HARVESTER TRACTORS

4100, 1970 (Fair)	5500*
2504, ldr., 1970 (Rough)	2925
1466 diesel, 1972 (Good)	9900
1206 diesel, 1964 (Fair)	5900*
1066 diesel, 1972 (Good)	9700*
1066, 1972 (Good)	8800*
806, 1964 (Good)	5000*
806 diesel, 1964 (Fair)	3700*
806, 1964 (Fair)	3100*
706, 1964 (Fair)	2700*
560, 1961 (Rough)	1650*
460, 1960 (Fair)	1350*
450, 1957 (Fair)	1050*
400, (Rough)	450*
350, 1960 (Rough)	600
300, plow, 1958 (Good)	1100*
250, ldr., 1956 (Rough)	900*
WD9, (Rough)	585
Sup. M, 1954 (Rough)	800
Sup. M, 1951 (Fair)	700*
M, 1952 (Fair)	1075*
M, 1951 (Rough)	675*
M, 1951 (Rough)	675
M, 1950 (Rough)	480
Sup. H, 1953 (Rough)	450
H, 1951 (Rough)	520
H, 1950 (Rough)	350*
H, ldr., 1949 (Fair)	660
H, (Rough)	280
A, 1947 (Good)	950
Cub, 1971 (Good)	1250*
Cub, 1960 (Fair)	1035
Cub, mo., 1950 (Fair)	775*

MASSEY-FERGUSON TRACTORS

1085 diesel, 1975 (Rough)	6700*
245 diesel, 1978 (Good)	5250
175, 1970 (Fair)	3900
150, ldr., 1971 (Fair)	2750
65, 1962 (Good)	2625
65 diesel, 1964 (Fair)	1900*
65, 1961 (Fair)	1650*
65 diesel, 1959 (Good)	2225
35, ldr., 1963 (Good)	2570*
35, 1955 (Rough)	1575

MINNEAPOLIS-MOLINE TRACTORS

Sup. 670, 1967 (Fair)	2300*
Z, cult.,	300

OLIVER TRACTORS

2100 diesel, 1966 (Rough)	6250*
1850 diesel, 1967 (Fair)	3600*
1800, 1962 (Fair)	1800
1600, 1961 (Fair)	2150*
880 diesel, 1959 (Fair)	925*
770 diesel, 1959 (Fair)	1300*
770, 1958 (Fair)	1200*
770, 1958 (Rough)	725
Sup. 88, 1958 (Rough)	600*
60, 1940 (Fair)	370

WHITE TRACTORS

2-105 diesel, 1975 (Good)	10,300*
2270 diesel, 1969 (Rough)	6250*

JONES FARM EQUIPMENT CO.
Dothan, Alabama
(September 9, 1980

ALLIS-CHALMERS TRACTOR

5040 diesel, 1976 (Good)	2900

CASE TRACTORS

2670 diesel, cab, duals, 1976 (Good)	16,950
2670 diesel, duals, 1975 (Excellent)	18,500*
2470 diesel 1975 (Good)	9000
1030 diesel, 1967 (Fair)	2000
930 diesel, 1964 (Fair)	1400
930 diesel, 1964 (Fair)	1650
380 diesel, 1975 (Excellent)	3700*

DAVID BROWN TRACTORS

995 diesel, 1973 (Excellent)	3500
990 diesel, 1965 (Fair)	700
990 diesel, 1964 (Good)	1550
885 diesel, 1973 (Excellent)	2500*

MASSEY-FERGUSON TRACTORS

1135 diesel, 1974 (Good)	6300*
1135 diesel, 1973 (Good)	6200*
1135 diesel, 1973 (Good)	6150*
1130 diesel, duals, 1967 (Good)	4000
1105 diesel, 1975 (Good)	8250
1085 diesel, 1974 (Good)	5300*
1085 diesel, 1973 (Fair)	4100*
265 diesel, 1976 (Good)	5650
255 diesel, 1979 (Excellent)	6000
255 diesel, 1976 (Good)	5000*
245 diesel, 1976 (Excellent)	5500
235 diesel, 1975 (Good)	4200
180 diesel, 1967 (Fair)	3300*
175 diesel, 1970 (Good)	3800
175 diesel, 1966 (Good)	3500*
165 diesel, 1968 (Good)	3275*
165 diesel, 1967 (Good)	3400
165 diesel, 1967 (Fair)	3100*
165 diesel, 1967 (Good)	3400
165 diesel, 1967 (Good)	3350*
165 diesel, 1967 (Good)	3450
165 diesel, 1965 (Good)	3300*
165 diesel, 1965 (Good)	3400
165 diesel, 1965 (Good)	3300
150 diesel, 1967 (Good)	2600*
135 diesel, 1973 (Good)	3350
135 diesel, 1970 (Excellent)	3550
135 diesel, 1969 (Excellent)	3400
135 diesel, 1966 (Good)	3000
130 diesel, 1969 (Rough)	1550
65 diesel, 1964 (Fair)	1600*
65 diesel, 1963 (Fair)	1600
65 diesel, 1960 (Fair)	1350
50, 1958 (Good)	1650*
50, 1958 (Fair)	1225
35 diesel, 1963 (Good)	1800
35 diesel, 1963 (Good)	2150
35 diesel, 1962 (Rough)	600
35 diesel, 1962 (Good)	2050
35, 1959 (Good)	1550
35 diesel, 4 cyl., 1959 (Rough)	550
35, 1958 (Good)	1625
35, 1958 (Good)	1650
35, 1956 (Fair)	1350*
35, 1956 (Fair)	1400
35, 1956 (Fair)	1050
TO30, 1952 (Rough)	550
TO20, 1949 (Fair)	675
TO20, 1949 (Good)	800

FORD-FERGUSON TRACTORS

9N, 1946 (Good)	1000
9N, 1944 (Fair)	700

FORD TRACTORS

8000 diesel, 1970 (Good)	4800
7700 diesel, cab, 1979 (Excellent)	15,600
7600 diesel, 1978 (Fair)	5250*
7000 diesel, 1973 (Good)	6050
7000 diesel, 1973 (Good)	6150
5000 diesel, 1971 (Good)	4350
5000 diesel, 1966 (Good)	3650
5000 diesel, Select-O-Speed, 1966 (Rough)	2050*
5000 diesel, 1965 (Good)	3500
4600 diesel, 1979 (Excellent)	8250
4000 diesel, 1970 (Excellent)	5200
4000 diesel, 1970 (Good)	4400*
4000, 1967 (Fair)	3000
4000, 1963 (Good)	2000*
4000 diesel, 1963 (Good)	2100*
3000 diesel, 1971 (Excellent)	3800
3000 diesel, 1970 (Good)	3500
3000 diesel, 1966 (Rough)	1250*
2000, 1967 (Fair)	2300
2000, sprayer, 1966 (Rough)	775
2000 diesel, 1965 (Good)	2600
2000, Select-O-Speed, 1964 (Rough)	850*
2000 diesel, 1963 (Good)	1700
960, 1955 (Rough)	800
871, LP, 1961 (Rough)	875
860, 1955 (Rough)	800
851 diesel, 1958 (Excellent)	2400
850, 1956 (Good)	1950*
850, 1956 (Rough)	900
841 diesel, 1958 (Excellent)	2300
641, 1960 (Good)	1700
641, 1958 (Fair)	1450
640, 1955 (Fair)	1450
NAA, 1954 (Fair)	1450
Jub., 1953 (Fair)	1525*
Jub., 1953 (Excellent)	2000
Jub., LP, 1953 (Fair)	1400*
Pow. Maj. diesel, 1967 (Rough)	350
Sup. Dexta, 1963 (Rough)	600*
8N, 1951 (Good)	1100
8N, 1951 (Good)	1150
8N, 1950 (Good)	925
8N, ldr., 1950 (Good)	1100*
8N, 1948 (Rough)	675
8N, 1948 (Fair)	775

INTERNATIONAL HARVESTER TRACTORS

1566 diesel, 1975 (Good)	11,500
806 diesel, 1963 (Fair)	3350
706, 1964 (Rough)	1950
656, 1967 (Good)	4200*
656, 1967 (Good)	3900*
656 diesel, 1966 (Fair)	3200*
574 diesel, 1972 (Good)	3600*
574 diesel, 1972 (Good)	3500*
560 diesel, corn picker, 1962 (Fair)	1150
504, 1964 (Fair)	1250
460, 1958 (Good)	1175*
444 diesel, 1970 (Fair)	1700
444 diesel, 1969 (Fair)	1900
444 diesel, 1967 (Fair)	2000
B414 diesel, 1960 (Fair)	725
B414 diesel, 1960 (Fair)	750
300, 1956 (Fair)	600

(More...)

Auctions

(continued)

240, cotton picker, 1959 (Fair)	900*
240, cotton picker 1959 (Fair)	925*
A, 1944 (Good)	400
Cub, mo., 1967 (Good)	1425
Cub, 1948 (Good)	1275

JOHN DEERE TRACTORS

4240 diesel, 1979 (Excellent)	18,000
4030 diesel, 1974 (Good)	9500
4020 diesel, 1968 (Good)	6400
4020 diesel, duals, 1967 (Good)	5900
4010 diesel, ldr., 1962 (Good)	3600*
3020 diesel, 1968 (Good)	5000*
3020 diesel, 1968 (Good)	4700*
2640 diesel, 1977 (Good)	6000
2020 diesel, 1969 (Good)	3250
1520 diesel, 1970 (Good)	4000
1020 diesel, 1967 (Good)	3350
1020 diesel, 1966 (Fair)	2600
1010, 1963 (Excellent)	2125
730 diesel, 1959 (Good)	1200
435 diesel, 1959 (Good)	725
420, 1956 (Good)	775
330, cult., 1958 (Excellent)	1600
40, 1953 (Fair)	400
B, 1951 (Good)	475
M, cult., plt., plow, har., 1951 (Good)	950

LONG TRACTORS

460 diesel, 1976 (Good)	3550
445 diesel, 1976 (Fair)	1800
384 diesel, 1971 (Fair)	2350

MASSEY-HARRIS TRACTOR

Pony, cult., har., (Good)	800

OLIVER TRACTORS

4-150 diesel, 1975 (Fair)	6600
2155 diesel, 1976 (Fair)	4200
1250 diesel, 1967 (Rough)	675
550 diesel, 1959 (Good)	1450
550 diesel, 1958 (Good)	1150

VERSATILE TRACTOR

145 diesel, 1969 (Good)	4750*

BILL ENLOW TRACTOR SALES
Tulsa, Okla.
(September 13, 1980)

ALLIS-CHALMERS TRACTORS

WD, 1949 (Fair)	500
WD, 1949 (Fair)	475
WD, 1951 (Good)	680*
WD45, 1955 (Good)	750*
5020 diesel, 1980 (Excellent)	3400

CASE TRACTORS

VAC, 1953 (Good)	580
DC-4, 1953 (Good)	435*
430 diesel, 1963 (Good)	2000
430 diesel, 1964 (Good)	1775
530 diesel, 1962 (Good)	2325
600, 1958 (Good)	850
600, 1959 (Fair)	700
1030 diesel, 1968 (Fair)	2175
1070 diesel, 1972 (Good)	5800*

DAVID BROWN TRACTORS

885 diesel, 1973 (Good)	2750
990 diesel, 1963 (Fair)	1500*
990 diesel, 1971 (Good)	2000*
1200 diesel, 1968 (Good)	2150*
1200 diesel, 1969 (Good)	2100

FERGUSON TRACTORS

20, 1948 (Fair)	825
20, 1949 (Good)	975*
20, 1949 (Fair)	800*
20, 1950 (Good)	1170
30, 1951 (Good)	1225
30, 1952 (Fair)	910*
40, 1957 (Good)	1600*

FORD TRACTORS

9N, 1942 (Fair)	700*
9N, 1943 (Good)	950
9N, 1943 (Fair)	800
9N, 1943 (Good)	950
9N, 1944 (Fair)	875
9N, 1944 (Fair)	775
9N, 1945 (Good)	900
9N, 1945 (Good)	950
9N, 1945 (Good)	950
9N, 1945 (Good)	925
9N, 1946 (Fair)	750
9N, 1946 (Good)	975
9N, 1946 (Fair)	825
9N, 1946 (Good)	925
9N, 1946 (Good)	1050
9N, 1946 (Good)	1040
9N, 1947 (Good)	1000
9N, 1947 (Good)	1000
8N, 1947 (Good)	1250
8N, 1947 (Good)	1150
8N, 1948 (Fair)	1050
8N, 1948 (Good)	1250
8N, 1949 (Fair)	1075
8N, 1949 (Fair)	1075
8N, 1949 (Good)	1100
8N, 1950 (Fair)	1050
8N, 1950 (Good)	1400*
8N, 1950 (Fair)	1000*
8N, 1950 (Good)	1225
8N, 1951 (Good)	1200*
8N, 1951 (Good)	1175
8N, 1951 (Good)	1200
8N, 1952 (Good)	1325
8N, 1952 (Good)	1400
8N, 1952 (Good)	1625
8N, 1952 (Good)	1890
8N, 1952 (Good)	1700
NAA, 1953 (Rough)	1100
NAA, 1953 (Rough)	1150*
NAA, 1953 (Good)	1600
NAA, 1953 (Fair)	1500*
NAA, 1953 (Good)	1650*
NAA, 1953 (Good)	1675
NAA, 1953 (Fair)	1500
NAA, 1953 (Fair)	1500
600, 1954 (Good)	1550
600, 1954 (Rough)	1250*
600, 1955 (Good)	1710*
600, 1955 (Good)	1800*
600, 1956 (Good)	1800
340, 1956 (Good)	1650
800, 1955 (Fair)	1500*
801, 1957 (Good)	1900
801, 1958 (Good)	2100
841, 1958 (Good)	2000
871, Select-O-Speed, 1959 (Rough)	950
Dexta diesel, 1960 (Good)	1650*
Dexta diesel, 1963 (Rough)	975
Mjr. diesel, 1956 (Fair)	1060
2000, 1963 (Good)	2300*
2000 diesel, 1968 (Good)	2800
3000 diesel, 1967 (Good)	2950
3000 diesel, 1968 (Good)	2850
3000 diesel, 1971 (Good)	3100*
3000, 1973 (Good)	3500
4000 diesel, 1965 (Rough)	1750
4000 diesel, 1969 (Rough)	1800
4000 diesel, 1969 (Rough)	2000
4000 diesel, 1970 (Rough)	2050
4000 diesel, 1971 (Good)	3150*
4000 diesel, 1972 (Good)	3175
5000 diesel, Select-O-Speed, 1969 (Fair)	2100*
5000 diesel, 1970 (Good)	3750
7000 diesel, 1973 (Good)	6750
3600 diesel, 1978 (Excellent)	4125*
540 diesel, ldr., 1980 (Excellent)	12,800

INTERNATIONAL HARVESTER TRACTORS

Cub, mo., 1957 (Fair)	1100
Cub, mo., 1965 (Good)	1500
Cub 154, mo., 1974 (Good)	1850
Cub 154, mo., 1975 (Fair)	1450
A, 1946 (Good)	750*
Super C, 1952 (Good)	775
504, 1963 (Rough)	510
424, 1966 (Fair)	1250*
656 diesel, 1969 (Good)	3850

JOHN DEERE TRACTORS

420, 1957 (Good)	2000
2010, 1962 (Good)	1725
2010, 1964 (Good)	1650
2010 diesel, 1964 (Good)	2025
2010 diesel, 1965 (Good)	1800*
300, 1974 (Fair)	2250*

LEYLAND TRACTORS

344 diesel, 1965 (Good)	2100*
384 diesel, 1968 (Good)	2650*

MASSEY-FERGUSON TRACTORS

35, 1960 (Good)	1800*
35, 1961 (Fair)	1600*
35, 1963 (Good)	1825
35 diesel, 1963 (Good)	2400
35 diesel, 1963 (Good)	2550
50, 1961 (Good)	1875
50 diesel, 1963 (Good)	2800
65 diesel, 1960 (Good)	1950*
65, 1960 (Good)	1750
65, 1961 (Fair)	1550
65, 1961 (Rough)	1450
65 diesel, 1961 (Fair)	1625
65 diesel, 1962 (Good)	1825
65 diesel, 1962 (Good)	2050
65 diesel, ldr., 1963 (Good)	2725
65 diesel, 1963 (Good)	2700
65 diesel, 1964 (Good)	2550
Super 90 diesel, 1962 (Good)	1825*
135, 1966 (Fair)	2250
135, 1967 (Good)	2500
135 diesel, 1969 (Fair)	2950*
135 diesel, 1970 (Good)	3150*
135 diesel, 1972 (Good)	3500
165 diesel, 1965 (Fair)	3100*
165 diesel, 1967 (Good)	3300*
165 diesel, 1967 (Fair)	2900*
165 diesel, 1970 (Good)	3450
165 diesel, 1970 (Fair)	3000*
165 diesel, 1972 (Good)	3750*
165 diesel, 1973 (Good)	3800*
175 diesel, 1969 (Rough)	3200*
175 diesel, 1970 (Good)	3600
175 diesel, 1970 (Good)	3600
175 diesel, 1972 (Good)	3950*
180 diesel, 1965 (Fair)	3250*
180 diesel, 1966 (Good)	3600
180 diesel, 1968 (Good)	3300*
180 diesel, 1969 (Fair)	3100*
180 diesel, 1969 (Good)	3500*
180 diesel, 1970 (Good)	3675
180 diesel, 1971 (Good)	3750*
1100 diesel, 1965 (Rough)	1875
1100 diesel, cab, 1972 (Good)	4950*
1135 diesel, 1974 (Good)	6650
1135 diesel, 1975 (Good)	6875
202, ldr., 1968 (Good)	2850*
202, ldr., 1969 (Good)	3300
30, backhoe, 1968 (Good)	3200
30, ldr., 1970 (Good)	4450
230, 1978 (Good)	4750
230 diesel, 1980 (New)	6450*
230 diesel, 1980 (New)	6400*
245 diesel, 1980 (New)	7000*
245 diesel, 1980 (New)	7100
245 diesel, 1980 (New)	7200
245 diesel, 1980 (New)	6850
265 diesel, 1978 (Good)	6500*
275 diesel, 1977 (Good)	6450*
275 diesel, 1978 (Good)	6700*
275 diesel, 1980 (New)	11,600*
285 diesel, 1980 (New)	13,100*

MINNEAPOLIS-MOLINE TRACTOR

M-5, ldr., 1963 (Good)	1675

NUFIELD TRACTOR

4/60 diesel, (Good)	1960

OLIVER TRACTORS

Super 55 diesel, 1956 (Good)	1300
550, backhoe, 1964 (Good)	2300

SATOH TRACTORS

650 G, mo., 1974 (Good)	2100
Beaver, ldr., mo., 1980 (Excellent)	3700*

NOTES

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.

Prices reported are NOT averages.

Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

DEMONSTRATOR means—used for demonstrating only and in practically new condition.

November 7, 1980

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Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

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43rd annual

I&T MARKET STATISTICS ISSUE

Want some good news?

U.S. FARM EQUIPMENT EXPORTS SHOW STRENGTH, INDUSTRY TRADE BALANCE IMPROVES

■TO OPEN our Statistics Issue for 1980, a year that has not given the U.S. farm equipment industry much to cheer about, we thought we'd like to have some upbeat information to impart. We found it with receipt of first-half, 1980, import and export statistics from the Dept. of Commerce.

Briefly, U.S. exports were up 16 per cent in the first half of 1980 to $1.313 billion, compared with 1979's first six months. This continued the strong level of increase established in 1979—it also indicated that there may be a reversal in the trend of yearly declines in the favorable balance of trade experienced by the U.S. farm equipment industry.

In 1976, the U.S. had a favorable farm equipment trade balance of $537 million over imports. But exports didn't expand over the next two years, while imports increased substantially. Last year, exports jumped $604 million, but imports outdistanced them, rising $698 million.

This year, imports for the first six months were $1.128 billion and exports were $1.313 billion; the favorable balance was a solid $185 million. Here's the story in tabular form:

U.S. Farm Equipment Industry—Foreign Trade

(dollar volume in thousands)

Year	Exports	Imports	Balance
1976	$1,586,200	$1,049,405	+$536,795
1977	1,561,800	1,157,560	+404,240
1978	1,583,285	1,182,758	+400,527
1979	2,187,420	1,880,470	+306,950
1980 (Jan.-June)	1,313,177	1,127,756	+185,421

Source: U.S. Dept. of Commerce, Bureau of Industrial Economics

What caused the shift? In our opinion, a major factor has been the slowdown in 1980 of under-40-horsepower tractor imports from Japan, coupled with improved export sales to Australia, Latin America and other principal markets.

In the first half of last year, tractor imports from Japan were valued at $112 million; in the first half of 1980, they came to $104 million. Meanwhile, American sales of farm equipment to several key markets were up beyond inflation-caused increases: to Mexico—up 21 per cent to $124 million; to Venezuela, up 27 per cent to $34 million; to Argentina—up 168 per cent to $21 million; to Australia—up 47 per cent to $92 million; to South Africa—more than double to $22 million.

Tractors and tractor parts are the main product concerns of the U.S. farm equipment industry, both with regard to imports and exports. In the first half of 1980, we imported almost 57,000 tractors valued at $379 million and parts worth $217 million. We exported 16,687 units valued at $337 million, with parts value coming to $361 million.

Other Statistical Issue features

To pull together data for the farm equipment industry, I&T is dependent on several offices of the United States Dept. of Commerce. From the Bureau of Industrial Economics comes information about exports and imports. The Bureau of the Census provides data on shipments of farm machines and equipment from its Current Industrial Reports, and on equipment on farms from its Census of Agriculture.

Unfortunately, the Census Bureau has been caught up, we've been informed, in the 1980 Census of Population, and this has delayed several other things. At closing time for this issue, I&T was informed that the Current Industrial Reports we need for 1979 industry shipments data were still several weeks away. So we have to promise that you will see these tables in a later issue.

And at presstime, the Census of Agriculture has come out with preliminary reports on something over half of the states. There's an article in this issue carrying a look at what tractor-related data is available from the reports we've received. Again, we'll have to promise more in a later issue. □

NEW AGRICULTURAL WHEEL TRACTOR IMPORTS, JAN.-JUNE, 1979

(Excludes garden tractors except as indicated in headings, footnotes.)
Number of units/Value in thousands of dollars

Nation of Origin	Under 20 HP*	20-29 HP*	30-39 HP*	40-79 HP*	80-99 HP*	100 HP and Over*	HP Not Specifically Provided*
Canada	9/$29	12/$30	66/$271	302/$5,079	179/$5,247	445/$15,563	748/$33,000
United Kingdom		109/617	237/1,304	3,219/25,930	2,585/17,821	24/195	90/641
Belgium	1/7		3/20	23/224			12/156
West Germany	1/4		25/178	4,333/38,190	1,454/18,418	1,170/18,454	275/3,291
Italy	72/313	168/583	81/304	818/6,607	178/2,162	3/63	11/73
Rumania	242/1,112		685/1,271	1,287/3,013			7/67
Spain				64/506			14/94
U.S.S.R.		50/59					
Japan	10,976/27,892	12,035/40,144	10,557/33,909	701/5,318		347/670	505/1,308
Others				15/247		1/30	
TOTALS	**11,301/$29,358**	**12,374/$41,434**	**11,654/$37,258**	**10,762/$85,114**	**4,396/$43,647**	**1,990/$34,976**	**1,662/$38,627**

Source: U. S. Dept. of Commerce, Industry & Trade Administration.
*Excluding garden tractors. **Including garden tractors. The term "industrial" here is understood to refer to such machines as fork-lifts, but not industrial tractors as defined in the farm and industrial equipment industry.

NEW AGRICULTURAL WHEEL TRACTOR IMPORTS, JAN.-DEC., 1979

(Excludes garden tractors except as indicated in headings, footnotes.)
Number of units/Value in thousands of dollars

Nation of Origin	Under 20 HP*	20-29 HP*	30-39 HP*	40-79 HP*	80-99 HP*	100 HP and Over*	HP Not Specifically Provided*
Canada	21/$41	48/$96	144/$681	625/$11,979	345/$10,178	821/$29,358	1,579/$72,459
United Kingdom	19/132	242/1,310	330/1,820	7,997/66,026	3,611/26,386	24/195	92/667
Belgium	1/7	.....	10/69	87/827	1/19	1/69	12/155
France	.....	36/111	.....	34/1,731	2/63	.....	.....
West Germany	23/51	.....	25/178	9,125/82,337	2,416/30,017	1,281/21,059	320/3,884
Italy	234/1,649	519/1,868	103/382	1,033/8,734	219/2,500	14/325	26/230
Rumania	580/2,709	5/8	813/1,547	2,477/6,264	.....	2/22	8/80
Spain	.....	320/347	75/482	150/1,080	.....	.....	19/128
U.S.S.R.	.....	50/59	.....	158/544	.....	5/73	.....
Japan	17,480/44,088	26,856/89,370	16,435/57,383	2,876/21,635	6/59	350/760	526/1,434
Others	72/169	.....	2/18	39/342	.....	1/30	1/8
TOTALS	**18,430/$48,846**	**28,076/$93,189**	**17,937/$62,560**	**24,601/$201,499**	**6,600/$69,218**	**2,499/$51,891**	**2,583/$79,045**

Source: U.S. Dept. of Commerce, Industry & Trade Administration.
*Excluding garden tractors. **Including garden tractors. The term "industrial" here is understood to refer to such machines as fork-lifts, but not industrial tractors as defined in the farm and industrial equipment industry.

NEW AGRICULTURAL WHEEL TRACTOR IMPORTS, JAN.-JUNE, 1980

Number of units/Value in thousands of dollars

Nation of Origin	Under 20 HP*	20-29 HP*	30-39 HP*	40-79 HP*	80-99 HP*	100 HP and Over*	HP Not Specifically Provided*
Canada	9/$42	9/$25	63/$423	126/$3,628	114/$3,658	418/$15,718	898/$47,528
Italy	18/61	29/103	89/375	1,239/8,355	33/494	148/2,369	9/95
United Kingdom	8/6	106/721	368/2,559	4,994/45,636	1,666/17,851	27/641	53/449
West Germany	10/12	.....	91/1,989	5,050/54,472	2,139/30,162	525/13,995	4/89
Japan	12,028/29,038	10,980/37,309	4,948/23,552	1,511/11,548	5/36	2/31	34/241
Romania	.....	1,041/2,144	640/1,455	1,950/5,937	.....	.....	.....
U.S.S.R.	.....	1/2	.....	347/1,022	.....	.....	.....
Poland	.....	.....	1/6	54/429	103/584	47/525	.....
Others	4/32	62/338	11/499	77/1,241	1/13	3/69	2/38
TOTALS	**12,077/$29,193**	**12,228/$40,642**	**6,211/$30,859**	**15,348/$132,268**	**4,061/$52,798**	**1,170/$33,350**	**1000/$48,446**

Source: U.S. Dept. of Commerce, Bureau of Industrial Economics
*Excluding garden tractors.

ot Elsewhere ecified, Ex- ding Industrial, cluding Garden pes**	Totals	
299/$4,183	2,060/$63,407	Canada
984/7,434	7,248/53,942	United Kingdom
	39/407	Belgium
127/1,512	7,385/80,047	West Germany
297/2,573	1,628/12,678	Italy
2/22	2,223/5,495	Rumania
27/242	105/842	Spain
12/103	62/162	U.S.S.R.
2,031/2,714	37,152/111,955	Japan
82/47	98/324	Others
3,861/$18,834	58,000/$329,248	TOTALS

Not Elsewhere Specified, Ex- uding Industrial, cluding Garden Types**	Totals	
461/$8,224	4,044/$133,016	Canada
1,290/9,519	13,605/106,055	United Kingdom
1/6	113/1,152	Belgium
2/42	74/1,947	France
587/9,058	13,777/146,584	West Germany
871/6,467	3,019/22,155	Italy
2/22	3,887/10,652	Rumania
31/288	595/2,325	Spain
158/577	371/1,253	U.S.S.R.
4,534/5,144	69,063/219,893	Japan
105/326	220/893	Others
8,042/$39,673	108,768/$645,925	TOTALS

ot Elsewhere cified, Includ- Garden, Roto- tiller Type	Totals	
156/$1,872	1,793/$72,894	Canada
358/2,386	1,923/14,238	Italy
29/189	7,251/68,052	United Kingdom
200/3,552	8,019/104,271	West Germany
3,884/2,512	33,392/104,267	Japan
15/71	3,646/9,607	Romania
.....	348/1,024	U.S.S.R.
.....	205/1,544	Poland
115/512	275/2,742	Others
757/$11,094	56,852/$378,644	TOTALS

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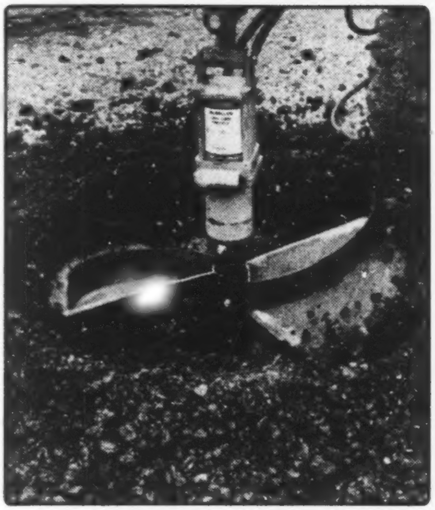

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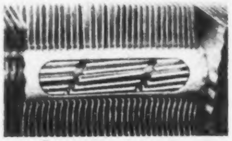

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DOLLAR VALUE OF FARM EQUIPMENT IMPORTS BY COUNTRY OF ORIGIN, Jan., 1976-June, 1980

(In thousands)

Country	Jan.-Dec. 1976	Jan.-Dec. 1977	Jan.-Dec. 1978	Jan.-Dec. 1979	Jan.-June 1980
Canada	$601,760	$619,662	$506,728	$831,155	$545,640
Mexico	7,300	8,363	6,277	10,082	5,410
Brazil	NA*	NA*	2,194	892	510
Sweden	941	2,077	1,708	4,818	2,229
Norway	1,666	1,751	1,075	1,273	909
Denmark	4,931	4,054	4,513	7,158	3,834
Netherlands	13,638	13,560	12,690	16,942	10,806
United Kingdom	102,208	110,071	125,241	209,967	121,719
Belgium	75,979	78,191	66,347	93,709	35,854
France	36,386	36,715	36,351	62,294	40,366
West Germany	90,139	118,861	141,392	231,521	147,484
Austria	2,255	1,219	783	1,188	676
Hungary	6,978	4,474	4,673	10,727	5,953
U.S.S.R.	1,806	1,415	1,113	2,715	1,127
Poland	582	3,705	1,746	1,346	2,551
Romania	10,029	10,451	8,372	11,648	9,870
Italy	32,077	50,246	75,066	78,523	52,441
Spain	4,614	4,326	3,768	9,239	3,189
Israel	882	940	1,545	2,616	2,032
New Zealand	1,396	2,525	1,918	5,312	3,684
Australia	4,988	3,642	3,218	5,937	2,283
Japan	39,360	73,861	167,858	267,599	121,945
China (Taiwan)	NA*	1,273	1,446	1,916	819
South Africa	NA*	3,830	3,972	6,332	3,229
Others	9,490	2,347	2,762	5,561	3,196
TOTAL	**$1,049,405**	**$1,157,560**	**$1,182,758**	**$1,880,470**	**$1,127,756**

SOURCE: U.S. Dept. of Commerce, Industry & Trade Administration.
*Data not available, included with "others."

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IMPORTS OF FARM EQUIPMENT BY PRODUCT

Product	Jan.-Dec., 1978 Quantity	Jan.-Dec., 1978 Value in Thousands of Dollars	Jan.-Dec., 1979 Quantity	Jan.-Dec., 1979 Value in Thousands of Dollars	Jan.-June, 1980 Quantity	Jan.-June, 1980 Value in Thousands of Dollars
Knives & Cutting Blades	6,864,882	$ 4,905	7,030,211	$ 4,926	5,531,604	$ 7,158
Plows & Listers	6,847	9,142	20,971	11,620	5,707	9,330
Cultivators & Weeders	13,95[illegible]	18,356	22,026	31,345	13,214	19,312
Parts of Plows, Cultivators, Weeders & Listers	.....	23,501	.....	30,534	.....	18,160
Harrows, Rollers, Stalk Cutters, Soil Pulverizers	48,977	8,580	29,416	8,322	13,585	7,456
Parts of Harrows, Rollers, Stalk Cutters, etc.	.....	NA	.....	15,538	.....	10,824
Planting, Seeding & Fertilizing Machinery	46,919	39,634	32,080	43,253	17,606	29,783
Parts of Planting, Seeding & Fertilizing Machinery	.....	NA	.....	14,685	.....	8,604
Haying Machinery other than Mowers	6,582	8,464	9,749	15,655	7,968	22,830
Mowers except Lawn Mowers	11,581	13,450	18,641	20,600	11,128	16,919
Harvesting Machines, NES	22,382	226,333	17,623	282,895	11,323	212,285
Parts of Harvesting Machines	.....	NA	.....	113,999	.....	59,515
Farm Wagons & Carts	10,546	9,304	11,900	10,559	6,857	8,268
Agricultural Machines & Implements, NES	.....	62,436	.....	102,254	.....	50,216
Parts of Agricultural Machines, NES	.....	131,725	.....	72,262	.....	38,314
Tractors, Agricultural, Wheel-Type, New, excluding Industrial*	92,049	448,216	108,787	645,952	56,852	378,644
Tractors, Agri., Used	4,284	23,435	4,132	25,740	1,616	10,155
Parts for Agri. Tractors	.....	307,704	.....	451,981	.....	216,914

SOURCE: U.S. Dept. of Commerce, Bureau of Industrial Economics.

NES—Not elsewhere specified. NA—Not available.

*Use of the term "industrial" here is understood to refer to such machines as fork-lifts but not to industrial tractors as commonly defined in the farm and industrial equipment industry.

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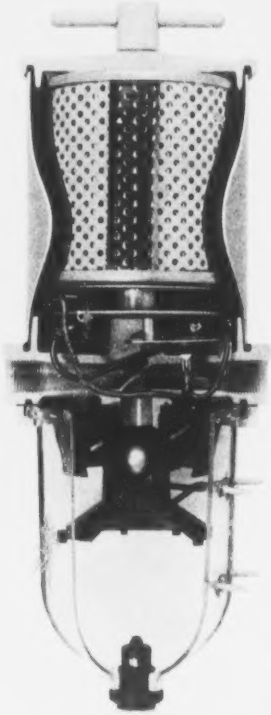

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VALUE OF FARM EQUIPMENT EXPORTS BY COUNTRY OF DESTINATION, 1979

Value in thousands of dollars.

Western Hemisphere			
Canada	$1,003,343	El Salvador	$ 3,354
Mexico	204,046	Panama	4,829
Honduras	7,360	Dom. Republic	7,057
Costa Rica	6,213	Colombia	11,414
Trinidad	3,164	Peru	7,456
Venezuela	51,861	Chile	8,211
Ecuador	9,696	Paraguay	2,808
Bolivia	2,743	Argentina	20,756
Brazil	24,389	Other W. Hemisphere	20,342
Guatamala	10,265	Total W. Hemisphere	1,408,887
Europe			
Sweden	$ 8,892	Belgium	$ 93,668
United Kingdom	66,786	West Germany	67,402
Netherlands	11,459	Hungary	8,078
France	90,350	Poland	3,692
Switzerland	3,033	Italy	9,692
U.S.S.R.	10,383	Greece	7,976
Spain	14,042		
Yugoslavia	6,020	Other Europe	5,815
Denmark	8,694	Total Europe	415,982
Middle East			
Syria	$ 2,150	Iran	$ 2,350
Iraq	2,917	Kuwait	2,932
Israel	17,859	Other Middle East	5,655
Saudi Arabia	19,732	Total Middle East	53,898
Asia and Pacific			
India	$ 3,397	South Korea	$ 19,659
Thailand	5,078	Australia	119,390
Malaysia	2,823	New Zealand	8,906
Indonesia	2,360	Japan	38,108
Singapore	18,343		
Philippines	6,680	Other Asia-Pacific	7,538
China (PRC)	3,022	Total Asia-Pacific	233,821
Africa			
Lybia	$18,237	Egypt	$ 4,988
Sudan	3,242	Nigeria	2,764
Ivory Coast	12,368	Other Africa	11,699
Rep. South Africa	21,452	Total Africa	74,752
Total Exports, Agricultural Tractors & Equipment			$2,187,420

Source: U.S. Dept. of Commerce, Industry & Trade Administration

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VALUE OF FARM EQUIPMENT EXPORTS BY COUNTRY OF DESTINATION, JAN.-JUNE, 1980

Value in thousands of dollars.

Western Hemisphere			
Canada	$587,784	Nicaragua	$ 1,912
Mexico	123,741	Panama	1,479
Honduras	3,587	Dominican Republic	9,884
Costa Rica	3,199	Colombia	7,501
Trinidad	2,222	Peru	5,813
Venezuela	33,618	Chile	5,834
Ecuador	4,768	Paraguay	2,077
Uruguay	2,931	Argentina	20,570
Brazil	15,534	Other W. Hemisphere	7,705
Guatamala	3,296	Total W. Hemisphere	842,335
Europe			
Sweden	$ 5,417	Belgium	$ 48,063
United Kingdom	39,991	West Germany	42,389
Netherlands	6,376	Hungary	3,285
France	61,869	Poland	1,291
Switzerland	2,085	Italy	8,608
U.S.S.R.	2,216	Greece	2,036
Spain	9,909	Other Europe	6,358
Yugoslavia	4,646		
Denmark	7,483	Total Europe	252,022
Middle East			
Syria	$ 1,820	Saudi Arabia	$ 11,410
Iraq	1,489	United Arab Emirates	977
Israel	9,161	Other Middle East	3,558
Kuwait	1,938	Total Middle East	30,353
Asia and Pacific			
India	$ 1,638	South Korea	$ 1,456
Thailand	1,956	Australia	91,584
Malaysia	1,173	New Zealand	4,903
Indonesia	2,346	Japan	22,873
Singapore	14,199	Other Asia-Pacific	1,886
Philippines	2,204		
China (PRC)	2,074	Total Asia-Pacific	148,292
Africa			
Lybia	$ 4,685	Nigeria	$ 2,321
Sudan	747	Rep. of South Africa	21,512
Ivory Coast	1,899	Other Africa	5,825
Zaire	690		
Egypt	2,496	Total Africa	40,175
Total Exports, Agricultural Tractors & Equipment			$1,313,177

Source: U.S. Dept. of Commerce, Industry & Trade Administration.

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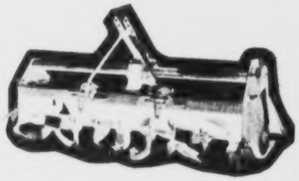

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FARM EQUIPMENT EXPORTS BY TYPE OF PRODUCT

Product	Jan.-Dec., 1978 Quantity	Jan.-Dec., 1978 Dollar Value in Thousands	Jan.-Dec., 1979 Quantity	Jan.-Dec., 1979 Dollar Value in Thousands	Jan.-June, 1980 Quantity	Jan.-June, 1980 Dollar Value in Thousands
Combines, pull-type	2,347	28,546	2,460	36,467	3,357	78,468
Combines, self-propelled	5,716	103.658	6,680	143,364	1,192	23,123
Cultivators, tractor-drawn or mounted	4,427	9,419	5,523	12,373	4,868	8,181
Cultivators, NEC, and Weeders	7,862	5,034	6,074	6,478	2,440	2,926
Farm Elevators and Blowers	2,956	7,264	3,531	9,372	1,782	5,167
Farm Wagons and Carts	5,538	4,160	5,985	3,227	1,580	1,612
Parts for Farm Wagons and Carts	.....	2,112	.....	2,646	.....	8,777
Fertilizing Machines	18,138	20,297	47,442	24,510	24,732	10,921
Forage Harvesters	NA	NA	3,861	29,824	3,708	24,499
Harrows, Disk	7,809	20,112	11,505	26,781	4,764	13,604
Harrows, NEC, & Soil Pulverizers	11,918	11,311	11,972	11,693	6,051	5,735
Parts for Harrows, Stalk Cutters & Soil Pulverizers	.....	14,560	.....	13,680	.....	5,890
Harvesting Machines, NEC	9,936	64,363	11,021	91,541	7,522	52,425
Harvesting Machine Parts	.....	76,248	.....	60,731	.....	40,648
Hay Balers	8,887	32,529	10,525	42,816	9,213	43,908
Haying Machines, NEC (incl. rakes & tedders)	7,939	15,685	7,286	25,353	3,639	16,116
Parts for Haying Machines	.....	27,141	.....	31,839	.....	15,373
Mowers, Cutterbar, tractor-drawn	2,555	4,073	2,853	6,181	2,041	4,523
Mowers, Rotary, tractor-drawn (excl. lawn mowers)	3,271	3,431	9,277	6,391	8,155	6,296
Mowers, NEC, tractor-drawn (excl. lawn mowers)	2,749	6,126	2,720	7,588	1,430	4,746
Planting Machines	4,536	6,869	8,218	11,260	3,961	5,875
Plows, Disk	6,311	8,301	4,461	6,687	2,483	4,007
Plows, Moldboard	3,043	7,354	3,415	11,050	2,058	6,441
Plows & Listers, NEC	5,199	7,831	6,067	12,243	5,928	7,577
Parts for Plows, Listers, Cultivators & Weeders	.....	27,302	.....	36,494	.....	19,829
Seeding Machines	10,682	16,531	24,409	22,549	9,889	10,429
Parts for Planting, Seeding & Fertilizing Machines	.....	19,261	.....	18,489	.....	10,451
Farm Tractors:						
Under 40 PTO HP	4,426	14,932	4,471	21,940	2,912	12,776
40-59 PTO HP	1,970	15,846	2,605	23,038	908	8,704
60-79 PTO HP	2,955	29,761	1,733	20,809	806	10,121
80-99 PTO HP	2,673	41,217	1,608	25,139	736	13,166
100-119 PTO HP	4,628	81,263	4,182	79,125	2,239	47,033
120-139 PTO HP	5,293	98,064	6,142	127,612	3,613	84,952
140-159 PTO HP	2,530	56,603	2,598	61,816	1,170	31,036
160-179 PTO HP	840	23,395	1,241	37,109	660	22,611
180 HP & Over	2,052	63,043	2,801	101,755	2,002	80,320
Other Farm Tractors	NA	NA	4,034	53,607	1,641	25,839
Parts for Farm Tractors	NA	NA	.....	611,457	.....	361,289

SOURCE: U.S. Dept. of Commerce, Bureau of Industrial Economics
NEC—Not elsewhere counted or classified. NA—Not available.

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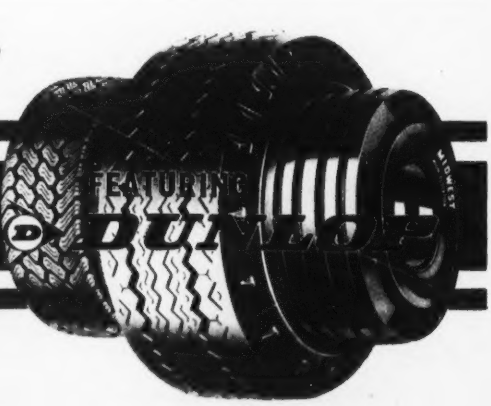

Circle (16) on Reply Card

Is farm tractor population increasing?

By Bill Fogarty

Not actually, but early data from the 1978 Census of Agriculture reveals the presence of tractors on farms that hadn't been noted with earlier methods used by the Bureau of the Census. Some states (Kentucky, for example) show major 'increases.'

■MORE TRACTORS on farms than we had thought! That's what comes tumbling out of some very preliminary and partial data from the 1978 Census of Agriculture, as provided by the Bureau of the Census.

According to Census spokespeople, "significant improvements in data collection procedures" were used in the 1978 enumeration that hadn't been available in 1974, when the previous Census of Agriculture was taken.

The improvements, says the bureau, were in two areas. The first was in the mailing lists used to send farmers their census report forms. The second was a door-to-door canvass of sample households in rural areas. The results allowed the bureau to identify additional farms which would have been missed under 1969 and 1974 procedures.

The Bureau of the Census was able to provide I&T with preliminary reports on a little over half the states before our deadline for this issue. In every case, we found an "increase" in the number of wheel tractors on farms from the 1974 count, whether they were farms with sales of $2,500 or more, or all farms.

On paper, this "increase" represents a reversal in a trend that has been going on in some areas for two decades, in others for 15 years. The 1964 Census of Agriculture counted a peak of 4,782,872 tractors on U.S. farms, followed by 4,614,554 in 1969. With the refinement in data gathering, we could get a total exceeding that of 1964.

In some states with major tractor populations, the numerical increase from the 1974 count are notable. In Iowa (the most tractor-populous state), the enumerators found 14,145 more units in 1978 than in 1974, up 4.6 per cent to 328,275.

In other states, also with important tractor populations, the increases were dramatic: Pennsylvania's total, 119,223 in 1974, went up by 24,000 units or 24 per cent! And Kentucky—126,357 tractors in 1974 *and 165,011 in 1978, up 30 per cent!*

With more tractors actually existing on U.S. farms than had been assumed, what inferences can be drawn? Perhaps it would be best to sit tight until more detail is available—reports from all the states and counties, plus the number of tractor models which were less than five years old when the census was taken in January, 1979. But a few things are clear:

- Tractors are lasting longer than previous estimates had indicated.
- If the amounts of fuel, lubricant, replacement parts, etc., sold in a given state remain constant and the number of tractors is higher, there is less average use per tractor than previous data indicated, and also less maintenance per unit.

Definitions of farms

In 1974's census, the bureau, in accord with the U.S. Dept. of Agriculture, defined a farm for statistical purposes as any place from which $1,000 or more of agricultural products were sold, or normally would have been sold, during the census year. (This definition was also applied for the 1978 census.) In the three previous censuses, a farm was defined as any place with less than 10 acres from which $250 or more of farm products were sold, or anyplace of 10 acres or more selling $50 or more of farm products.

Veteran watchers of the tractor market may be very interested not only in the newly discovered units that show up on these defined farms but also in others which are on farms outside the Bureau of the Census definition.

In recent years, the well-publicized push by many U.S. citizens to get out of the cities, even out of the suburbs, has resulted in the purchase of vast numbers of small

packages of rural land. Owners of these small acreages are sometimes affluent and sometimes of modest means; they may use the land for pasturing a few horses or other animals or even raising a few crops, often hoping for substantial accrual in the land's value. Very often, these owners buy a tractor to put on their "farms" that, by Bureau of Census definition, are not farms.

Such tractors, whether they are 30-year-old Ford 8Ns or gleaming, new Kubotas, comprise a rather substantial market for a certain segment of this industry, even though they are frequently hidden from the census enumerator by the definition.

As this brief report was written, I&T had received data from preliminary Census of Agriculture reports on 27 states, and it's our intention to insert in the table any late additions we get, right up to press time. If you don't count all 50 states in the table, you can expect to see it presented again, complete, in a later issue.

In the section which follows, Principal Machines on Farms, you'll find that I&T's estimate of tractors on farms as of July 1, 1980, does not take into account the changes in counting methods which produced the higher total tractor numbers in the 1978 Census of Agriculture. The estimate and table were prepared before the preliminary reports came out. ☐

Preliminary, partial report: NUMBERS OF TRACTORS ON FARMS, 1978 FARM CENSUS —SOME IMPORTANT CHANGES

	All Farms		Farms With Sales of $2,500 or More	
State (not all states data available at press time)	Ag Census 1978	Ag Census 1974	Ag Census 1978	Ag Census 1974
Alabama	75,519	66,588	54,767	43,827
Alaska	520	386	375	305
Arkansas	89,633	75,825	74,037	59,438
California	136,640	112,822	118,510	99,331
Colorado	60,718	55,286	54,228	50,158
Connecticut	9,251	7,405	6,831	6,165
Delaware	8,743	7,485	8,138	6,952
Idaho	55,759	49,689	50,781	45,068
Illinois	286,861	267,761	270,626	253,637
Indiana	183,227	164,535	164,108	147,163
Iowa	328,275	313,920	318,269	304,124
Kansas	160,700	158,607	150,051	147,090
Kentucky	165,011	126,357	140,903	98,198
Maine	15,084	12,508	11,268	10,392
Maryland	41,407	33,837	35,756	28,791
Massachusetts	10,974	8,630	8,523	7,012
Michigan	157,886	139,883	129,975	116,604
Missouri	205,224	185,123	182,533	151,015
Nebraska	177,872	168,085	172,853	162,197
Nevada	5,428	4,895	4,730	4,291
New Hampshire	5,665	4,616	3,895	3,420
New Jersey	23,249	18,579	19,411	16,055
New York	128,374	112,120	107,737	95,375
North Carolina	153,464	127,827	128,694	102,259
Ohio	206,624	184,634	178,978	157,769
Oregon	52,575	44,340	41,472	34,840
Pennsylvania	143,039	119,223	119,259	94,929
Rhode Island	1,748	1,285	1,261	1,025
Tennessee	129,424	107,936	99,406	70,208
Utah	22,345	20,054	18,461	16,036
Vermont	16,396	13,694	13,551	12,104
Virginia	90,200	73,847	72,107	55,188
Washington	58,454	49,433	47,917	40,983
West Virginia	28,021	22,112	16,361	10,366
Wisconsin	258,751	232,965	238,101	212,214
Wyoming	19,830	19,490	18,393	18,157

Source: 1978 Census of Agriculture, Preliminary State Reports.

Motor Vehicles and Specified Machines on U.S. Farms and Average Prices of Wheel Tractors, Designated Years[1]

Year	Tractors (exclusive of steam & garden)[2] Thousands	Motor Trucks Thousands	Grain Combines Thousands	Corn Pickers and Picker Shellers Thousands	Pick-up Balers Thousands	Field Forage Harvesters Thousands	Garden Tractors and Motor Tillers[3] Thousands	Wheel Tractors Wholesale Prices[4] Per Unit Dollars	Wheel Tractors Wholesale Prices[4] Horsepower Dollars
1925	549	459	.....	.....	.....	.....	.....	.....	.....
1926	621	559	.....	.....	.....	.....	.....	.....	.....
1927	693	662	.....	.....	.....	.....	.....	.....	.....
1928	782	753	.....	.....	.....	.....	.....	.....	.....
1929	827	840	.....	.....	.....	.....	.....	.....	.....
1930	920	900	61	50	.....	.....	.....	.....	.....
1931	997	920	.....	.....	.....	.....	.....	.....	.....
1932	1,022	910	.....	.....	.....	.....	.....	.....	.....
1933	1,019	865	.....	.....	.....	.....	.....	.....	.....
1934	1,016	875	.....	.....	.....	.....	.....	.....	.....
1935	1,048	890	.....	.....	.....	.....	.....	.....	.....
1936	1,125	923	.....	.....	.....	.....	.....	.....	.....
1937	1,230	990	.....	.....	.....	.....	.....	.....	.....
1938	1,370	1,042	.....	.....	.....	.....	.....	.....	.....
1939	1,445	1,020	.....	.....	.....	.....	.....	.....	.....
1940	1,545	1,047	190	110	.....	.....	.....	.....	.....
1941	1,675	1,095	225	120	.....	.....	.....	.....	.....
1942	1,885	1,160	275	130	25	.....	.....	.....	.....
1943	2,100	1,280	320	138	31	.....	.....	$ 579	$21
1944	2,215	1,385	345	146	34	.....	.....	$ 658	$24
1945	2,354	1,490	275	168	42	20	68	$ 665	$25
1946	2,480	1,550	420	203	54	25	80	$ 733	$28
1947	2,613	1,700	465	236	65	30	122	$ 783	$30
1948	2,821	1,900	535	299	90	45	159	$ 890	$33
1949	3,123	2,065	620	372	135	60	192	$ 994	$35
1950	3,399	2,209	714	456	196	81	216	$1,073	$37
1951	3,678	2,310	810	522	240	102	242	$1,234	$42
1952	3,907	2,410	887	588	298	124	268	$1,297	$42
1953	4,100	2,520	930	630	345	148	296	$1,359	$39
1954	4,243	2,610	965	660	395	175	315	$1,513	$39
1955	4,345	2,675	980	688	448	202	332	$1,554	$39
1956	4,480	2,707	1,005	715	505	220	353	$1,682	$41
1957	4,570	2,745	1,015	740	560	240	375	$1,842	$41
1958	4,620	2,775	1,030	755	600	258	400	$2,111	$46
1959	4,673	2,800	1,045	775	645	270	425	$2,189	$48
1960	4,688	2,834	1,042	792	680	291	450	$2,338	$49
1961	4,743	2,850	980	740	685	291	468	$2,578	$50
1961	4,763	2,885	960	730	703	300	485	$2,819	$51
1963	4,778	2,925	940	720	718	307	500	$3,046	$53
1964	4,786	2,970	920	705	734	312	513	$3,443	$53
1965	4,787	3,030	910	690	751	316	699	$3,541	$56
1966	4,783	3,017	888	686	752	316	725	$3,886	$58
1967	4,786	3,009	867	680	748	319	750	$4,257	$62
1968	4,766	3,016	847	673	739	321	770	$4,709	$66
1969	4,712	3,004	820	657	725	314	790	$4,976	$71
1970	4,619	2,978	790	635	708	304	805	$5,560	$76
1971	4,562	2,985	760	629	698	309	815	$6,190	$80
1972	4,509	2,993	725	625	687	315	825	$6,486	$84
1973	4,477	3,006	703	618	680	324	835	$6,953	$85
1974	4,478	3,020	685	618	677	332	850	$7,294	$86
1975	4,463	3,032	666	615	666	337	870	$8,459	$91
1976	4,434	3,043	647	610	642	342	890	$11,220	$112
1977	4,381	3,052	630	605	614	346	905	$12,692	$124
1978	4,350	3,054	615	600	595	345	917	$14,273	$132
1979	4,312	3,057	600	590	575	342	930	$16,572	$149
1980	4,270	3,057	590	580	550	340	938	$18,012	$166

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[1] SOURCE: Reports of the USDA and the Bureau of the Census. After 1959 Alaska and Hawaii are included. On-farm data after 1970, except for 1974, are estimated by I&T.

[2] Consists of Wheel and Crawler Tractors only after 1944. Prior to 1945 some Garden Tractors may have been included but the number was small.

[3] Motor Tillers included after 1964.

[4] Estimated at wholesale level by dividing **Value of Manufacturers' Shipments** by **Units Shipped** and by **Maximum Belt Horsepower**, data are published in "Current Industrial Reports" of the Bureau of the Census.

Principal Machines on Farms—1980

STATE	WHEEL AND CRAWLER TRACTORS 1954 Census Number	1959 Census Number	1964 Census Number	1969 Census Number	1974 Census Number	Estimated July 1, 1980 Number	TRACTOR MOLDBOARD PLOWS Estimated July 1, 1958 Number	Estimated July 1, 1980 Number
Maine	16,800	17,793	16,290	14,252	13,493	12,050	12,400	7,380
New Hampshire	6,635	6,605	6,253	4,953	4,989	4,630	4,600	2,800
Vermont	14,183	16,669	16,333	15,227	14,706	13,450	10,200	8,150
Massachusetts	12,656	12,068	11,575	9,537	9,341	8,120	8,800	5,900
Rhode Island	1,256	1,651	1,687	1,359	1,359	1,200	1,000	850
Connecticut	11,286	11,219	9,963	8,679	7,924	7,230	7,700	4,920
New York	129,741	138,670	136,304	122,645	118,313	108,900	107,000	81,000
New Jersey	25,223	24,726	22,042	19,984	19,324	17,160	21,500	15,700
Pennsylvania	137,476	144,759	144,149	126,810	124,251	112,500	118,600	95,000
Delaware	7,826	8,259	7,992	7,555	7,631	7,240	6,700	6,100
Maryland	35,774	37,291	37,203	34,174	34,705	32,060	30,500	26,500
NORTHEAST	**398,856**	**419,710**	**409,791**	**365,175**	**356,036**	**324,540**	**329,000**	**254,300**
Ohio	198,306	204,681	199,694	194,962	188,580	178,000	161,000	151,000
Indiana	176,016	186,853	181,086	174,055	167,382	158,600	149,000	136,000
Illinois	265,722	290,002	287,480	275,203	272,093	257,500	210,000	184,500
Iowa	297,015	327,863	329,172	318,998	317,052	295,700	235,000	214,500
Missouri	168,428	191,512	198,095	201,513	189,672	176,600	135,000	127,300
CORN BELT	**1,105,487**	**1,200,911**	**1,195,527**	**1,164,731**	**1,134,779**	**1,066,400**	**890,000**	**813,300**
Michigan	166,791	169,782	169,920	152,741	143,569	130,700	139,000	103,600
Wisconsin	213,903	234,387	247,427	229,752	237,457	213,800	171,000	150,600
Minnesota	249,332	275,833	284,887	258,614	260,535	236,900	210,000	174,300
LAKE STATES	**630,026**	**680,002**	**702,234**	**641,107**	**641,561**	**581,400**	**520,000**	**428,500**
North Dakota	112,558	121,039	122,056	118,069	123,072	114,600	84,000	74,000
South Dakota	109,123	115,639	120,100	111,532	114,546	102,300	84,000	71,000
Nebraska	159,977	175,254	180,423	166,098	170,423	156,600	108,000	90,200
Kansas	168,506	173,651	174,185	163,180	161,276	149,300	123,000	95,700
GREAT PLAINS	**550,164**	**585,764**	**596,764**	**558,879**	**569,317**	**522,800**	**399,000**	**330,900**
West Virginia	18,162	21,995	23,926	23,842	23,265	21,500	15,400	14,700
Kentucky	83,842	103,415	118,404	137,105	129,069	127,500	71,000	68,400
Tennessee	84,869	97,800	108,319	122,528	110,941	110,600	43,000	48,500
Virginia	64,750	75,143	78,989	79,347	76,121	74,100	52,000	46,800
North Carolina	120,595	140,639	149,850	150,825	130,140	129,000	57,600	53,500
APPALACHIAN	**372,218**	**438,992**	**479,488**	**513,647**	**469,536**	**462,700**	**239,000**	**231,900**
South Carolina	44,631	48,637	50,931	50,115	45,321	46,820	9,200	11,700
Georgia	85,192	89,392	89,049	84,366	77,067	83,240	23,500	24,000
Florida	31,858	35,820	41,295	42,958	44,192	47,760	12,300	15,200
Alabama	62,526	67,559	71,925	75,069	68,521	70,000	20,500	23,000
SOUTHEAST	**224,207**	**241,408**	**253,200**	**252,508**	**235,101**	**247,820**	**65,500**	**73,900**
Mississippi	79,575	84,425	90,347	88,677	76,808	79,900	29,700	28,300
Louisiana	49,985	53,229	60,618	63,194	55,933	59,100	15,400	17,300
Arkansas	79,799	83,852	90,993	86,977	78,083	82,500	41,900	40,800
DELTA STATES	**209,359**	**221,506**	**241,958**	**238,848**	**210,824**	**221,500**	**87,000**	**86,400**
Oklahoma	101,885	102,323	101,605	102,397	91,661	88,600	74,000	64,600
Texas	268,613	268,233	269,519	282,088	251,687	249,000	74,500	69,300
SOUTHERN PLAINS	**370,498**	**370,556**	**371,124**	**384,485**	**343,348**	**337,600**	**148,500**	**133,900**
Montana	54,163	59,510	61,832	58,729	58,457	53,200	30,500	26,300
Idaho	49,753	56,961	58,607	54,091	55,419	51,100	40,000	35,000
Wyoming	18,700	20,737	21,596	20,925	20,801	18,470	15,400	14,500
Colorado	59,647	64,051	63,906	59,112	58,091	52,100	34,000	28,800
New Mexico	16,817	17,146	17,919	15,998	17,021	15,800	11,300	9,000
Arizona	13,506	13,443	13,747	12,136	13,812	14,600	4,200	4,000
Utah	19,445	21,803	22,256	20,128	21,110	19,950	17,500	15,700
Nevada	4,356	5,297	5,557	5,318	5,515	4,820	3,100	2,600
MOUNTAIN STATES	**236,387**	**258,948**	**265,420**	**246,437**	**250,226**	**230,040**	**156,000**	**136,400**
Washington	57,048	63,114	65,813	58,600	59,542	56,000	42,000	38,300
Oregon	54,206	56,732	58,741	51,223	52,651	48,700	44,000	40,000
California	136,778	147,390	142,812	138,914	140,393	134,500	70,000	67,200
PACIFIC	**248,032**	**267,236**	**267,366**	**248,737**	**252,586**	**239,200**	**156,000**	**145,500**
TOTAL	**4,345,234**	**4,684,852**	**4,782,872**	**4,614,554**	**4,463,314**	**4,234,000**	**2,990,000**	**2,635,000**

Principal Machines on Farms—1980

	COMBINES[1]					CORN HEADS FOR COMBINES[2]		
STATE	1959 Census Number	1964 Census Number	1969 Census Number	1974 Census Number	Estimated July 1, 1980 Number	1969 Census Number	1974 Census Number	Estimated July 1, 1980 Number
Maine	1,077	875	218	242	230	120	141	140
New Hampshire	39	27	8	5	5	65	55	48
Vermont	431	344	113	87	70	175	238	242
Massachusetts	98	70	34	35	26	84	103	100
Rhode Island	24	20	5	7	5	21	10	10
Connecticut	112	77	40	15	9	92	85	70
New York	18,702	16,536	4,902	5,114	4,700	1,706	2,344	3,050
New Jersey	2,239	1,726	634	766	830	269	324	400
Pennsylvania	26,431	23,939	6,777	7,297	6,800	1,924	2,636	3,580
Delaware	1,903	1,780	979	1,127	1,100	566	681	780
Maryland	5,934	5,237	2,604	2,740	2,800	1,555	1,954	2,420
NORTHEAST	**56,990**	**50,631**	**16,314**	**17,435**	**16,575**	**6,577**	**8,571**	**10,840**
Ohio	57,060	50,291	20,805	26,009	26,400	11,892	17,515	22,350
Indiana	54,238	46,395	23,871	29,485	30,500	17,920	24,616	30,800
Illinois	93,366	80,857	48,116	55,085	55,000	37,649	46,362	54,900
Iowa	99,709	86,178	28,221	42,117	45,500	22,302	37,864	51,000
Missouri	51,993	44,535	24,208	26,253	26,400	16,112	18,278	20,000
CORN BELT	**356,366**	**308,256**	**145,221**	**178,949**	**183,800**	**105,875**	**144,635**	**179,050**
Michigan	45,764	41,360	13,053	14,649	13,700	4,306	7,098	9,100
Wisconsin	45,032	45,516	10,859	13,392	12,900	3,566	5,147	7,180
Minnesota	73,278	71,748	27,189	35,033	34,700	12,102	18,780	24,200
LAKE STATES	**164,074**	**158,624**	**51,101**	**63,074**	**61,300**	**19,974**	**31,025**	**40,480**
North Dakota	48,732	41,782	26,952	27,273	26,000	753	864	1,040
South Dakota	33,206	28,289	11,926	13,941	13,500	3,483	5,386	6,910
Nebraska	53,343	43,205	25,730	29,224	29,300	13,370	18,578	23,500
Kansas	72,115	59,813	41,601	41,871	40,200	6,533	8,038	9,130
GREAT PLAINS	**207,396**	**173,089**	**107,209**	**112,309**	**109,000**	**24,139**	**32,866**	**40,580**
West Virginia	951	1,020	245	307	260	147	199	210
Kentucky	10,617	9,737	4,565	6,329	6,700	3,196	4,390	5,650
Tennessee	13,003	11,537	5,773	6,843	7,640	2,458	2,734	3,280
Virginia	10,133	9,281	3,769	4,309	4,350	2,243	2,972	3,550
North Carolina	17,335	14,847	7,982	8,828	9,200	5,279	6,696	8,100
APPALACHIAN	**52,039**	**46,422**	**22,334**	**26,616**	**28,150**	**13,323**	**16,991**	**20,790**
South Carolina	8,595	7,085	4,483	4,706	5,020	1,803	2,285	2,880
Georgia	10,340	9,177	5,408	6,255	7,400	4,036	4,836	6,120
Florida	1,055	1,230	1,010	1,182	1,400	584	773	1,030
Alabama	5,116	4,806	3,423	3,988	4,630	1,635	1,858	2,160
SOUTHEAST	**25,106**	**22,298**	**14,324**	**16,131**	**18,450**	**8,058**	**9,752**	**12,190**
Mississippi	7,369	6,099	6,977	6,893	8,220	441	310	290
Louisiana	5,078	5,145	6,414	7,034	7,670	357	231	200
Arkansas	13,750	13,086	12,657	11,484	12,850	294	725	660
DELTA STATES	**26,197**	**24,330**	**26,048**	**25,411**	**28,740**	**1,092**	**1,266**	**1,150**
Oklahoma	27,038	21,668	14,909	14,797	14,000	457	511	560
Texas	40,723	31,355	21,223	19,394	19,500	1,743	1,858	2,590
SOUTHERN PLAINS	**67,761**	**53,023**	**36,132**	**34,191**	**33,500**	**2,200**	**2,369**	**3,150**
Montana	18,063	16,011	11,687	11,392	10,600	121	107	100
Idaho	12,703	11,330	7,639	8,113	7,750	202	252	285
Wyoming	3,757	2,962	1,523	1,690	1,550	112	149	190
Colorado	13,799	11,062	6,937	7,338	6,860	1,032	1,632	2,500
New Mexico	2,358	1,898	1,041	1,229	1,110	52	117	175
Arizona	824	559	412	530	640	25	23	30
Utah	3,136	2,421	1,442	1,442	1,310	134	196	230
Nevada	402	277	201	253	235	9	21	20
MOUNTAIN STATES	**55,042**	**46,520**	**30,882**	**31,987**	**30,055**	**1,687**	**2,497**	**3,530**
Washington	10,800	9,706	6,891	7,330	7,130	307	269	345
Oregon	10,587	8,372	5,107	5,266	5,000	167	106	95
California	9,169	8,366	5,619	5,373	5,300	633	696	800
PACIFIC	**30,556**	**26,444**	**17,617**	**17,969**	**17,430**	**1,107**	**1,071**	**1,240**
TOTAL	**1,041,527**	**909,637**	**467,182**	**524,072**	**527,000**	**184,032**	**251,043**	**313,000**

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[1] The Census in 1959 and 1964 included self-propelled and pull types. The Census in 1969 and 1974 and the estimated number for July 1, 1980 cover only the number of self-propelled combines.

[2] The Census of 1969 included only corn heads on class 1-5 farms, those with $2,500 or more of income. The Census in 1974 and the estimated number for July 1, 1980 cover all farms.

Principal Machines on Farms—1980

STATE	PICK-UP BALERS 1959 Census Number	1964 Census Number	1969 Census Number	1974 Census Number	Estimated July 1, 1980 Number	FIELD FORAGE HARVESTERS[1] 1964 Census Number	1969 Census Number	1974 Census Number	Estimated July 1, 1980 Number
Maine	3,137	3,339	2,446	2,255	1,980	998	712	914	1,370
New Hampshire	1,673	1,681	1,266	1,197	1,060	747	385	612	930
Vermont	5,210	5,796	4,171	3,975	3,260	2,358	1,542	2,328	3,250
Massachusetts	2,379	2,343	1,774	1,600	1,330	1,412	744	923	1,200
Rhode Island	247	250	171	172	140	233	88	122	150
Connecticut	2,110	1,971	1,604	1,313	1,215	1,561	788	777	910
New York	36,724	38,107	31,074	27,495	22,000	20,710	13,815	17,363	23,330
New Jersey	3,258	3,073	2,357	2,066	1,680	2,181	1,171	1,127	1,260
Pennsylvania	38,491	41,873	35,571	32,195	25,800	20,794	12,240	15,485	22,800
Delaware	856	664	609	628	530	475	245	422	630
Maryland	6,599	6,845	5,750	5,159	4,100	3,961	2,177	2,603	3,760
NORTHEAST	**100,684**	**105,942**	**86,793**	**78,055**	**63,095**	**55,430**	**33,907**	**42,676**	**59,590**
Ohio	41,809	43,607	40,101	36,137	27,700	11,759	7,788	9,757	14,380
Indiana	25,835	25,459	23,414	21,705	16,700	7,523	5,344	6,121	7,700
Illinois	38,792	38,163	33,291	29,822	21,600	16,295	10,130	11,333	14,450
Iowa	58,558	60,111	55,456	47,461	34,400	20,937	14,245	17,179	24,060
Missouri	31,697	36,265	38,929	38,487	29,300	9,315	6,884	7,430	8,050
CORN BELT	**196,691**	**203,605**	**191,191**	**173,612**	**129,700**	**65,829**	**44,391**	**51,820**	**68,640**
Michigan	28,414	31,502	26,915	23,897	18,500	15,077	8,986	11,682	16,800
Wisconsin	53,836	63,921	56,939	54,962	44,600	48,149	27,199	38,341	56,320
Minnesota	45,583	55,896	51,600	46,689	35,700	26,024	17,761	20,825	27,850
LAKE STATES	**127,833**	**151,319**	**135,454**	**125,548**	**98,800**	**89,250**	**53,946**	**70,848**	**100,970**
North Dakota	13,882	15,823	15,623	14,831	10,600	9,555	6,614	5,911	5,870
South Dakota	13,117	14,441	14,657	13,835	10,160	10,810	9,755	11,254	16,970
Nebraska	18,684	19,907	18,988	17,309	13,000	13,268	11,232	12,632	13,950
Kansas	24,595	28,086	27,464	26,846	20,500	17,035	11,712	10,651	11,400
GREAT PLAINS	**70,278**	**78,257**	**76,732**	**72,821**	**54,260**	**50,668**	**39,313**	**40,448**	**48,190**
West Virginia	5,459	7,362	8,013	7,444	6,350	1,155	1,143	1,478	1,780
Kentucky	18,397	21,476	24,121	23,536	18,500	3,157	3,621	4,400	5,300
Tennessee	13,103	15,234	17,686	17,090	14,800	3,002	2,953	3,602	4,500
Virginia	14,419	16,105	16,035	15,285	12,400	4,450	4,181	4,675	5,470
North Carolina	10,087	10,322	10,053	10,115	8,300	3,365	2,695	3,841	4,540
APPALACHIAN	**61,465**	**70,499**	**75,908**	**73,470**	**60,350**	**15,129**	**14,593**	**17,996**	**21,590**
South Carolina	4,325	4,468	3,857	3,719	3,140	1,139	887	1,075	1,290
Georgia	5,875	6,917	7,118	6,678	6,050	1,696	1,455	1,722	2,330
Florida	1,032	1,419	1,692	1,910	1,950	543	447	629	710
Alabama	4,361	6,231	7,227	7,662	6,920	1,233	1,250	1,513	1,860
SOUTHEAST	**15,593**	**19,035**	**19,894**	**19,969**	**18,060**	**4,611**	**4,039**	**4,939**	**6,190**
Mississippi	6,065	6,618	7,045	7,431	6,300	1,697	1,531	2,130	2,590
Louisiana	3,987	5,064	4,831	4,594	3,960	775	763	872	1,190
Arkansas	6,206	6,456	7,500	8,040	7,670	1,181	1,014	1,047	1,170
DELTA STATES	**16,258**	**18,138**	**19,376**	**20,065**	**17,930**	**3,653**	**3,308**	**4,049**	**4,950**
Oklahoma	11,353	12,965	14,246	14,432	13,270	2,820	1,872	1,740	1,970
Texas	13,591	15,737	18,208	18,534	18,700	4,643	3,556	3,215	3,820
SOUTHERN PLAINS	**24,944**	**28,702**	**32,454**	**32,966**	**31,970**	**7,463**	**5,428**	**4,955**	**5,790**
Montana	9,211	11,458	11,059	10,613	8,870	1,736	1,695	1,512	1,700
Idaho	11,323	13,072	12,057	12,048	10,500	2,696	1,907	2,048	2,390
Wyoming	3,496	4,259	4,357	4,383	3,870	1,086	924	995	1,190
Colorado	8,095	9,600	9,504	9,505	8,300	5,252	3,744	3,755	4,370
New Mexico	2,150	2,340	2,532	2,833	2,690	560	490	591	730
Arizona	995	1,001	860	1,018	885	556	281	314	480
Utah	5,891	6,389	5,887	5,957	5,480	1,989	1,378	1,560	1,930
Nevada	1,116	1,264	1,177	1,299	1,100	291	189	233	320
MOUNTAIN STATES	**42,277**	**49,383**	**47,433**	**47,656**	**41.695**	**14,166**	**10,608**	**11,008**	**13,110**
Washington	8,085	9,759	8,658	8,215	7,330	3,734	1,837	2,234	3,390
Oregon	6,482	8,007	7,218	7,195	6,500	2,419	1,532	1,496	2,160
California	9,164	8,389	8,829	6,435	5,310	3,189	1,666	2,006	3,430
PACIFIC	**23,731**	**26,155**	**22,705**	**21,845**	**19,140**	**9,342**	**5,035**	**5,736**	**8,980**
TOTAL	**679,754**	**751,035**	**707,940**	**666,007**	**535,000**	**315,541**	**214,568**	**254,475**	**338,000**

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[1] The Census in 1964 and the estimated number for July 1, 1980 include shear-bar and flail types. The Census in 1969 and 1974 covered only the number of shear-bar harvesters.

Principal Machines on Farms—1980

STATE	POWER TRACTOR MOWERS (Cutter bar type only) Estimated July 1, 1958 Number	Estimated July 1, 1980 Number	SIDE DELIVERY RAKES Estimated July 1, 1958 Number	Estimated July 1, 1980 Number	MOWER CONDITIONERS[1] 1974 Census Number	Estimated July 1, 1980 Number
Maine	9,000	6,700	10,000	5,530	1,378	1,920
New Hampshire	4,400	3,050	5,000	2,350	605	920
Vermont	10,000	8,900	10,300	6,900	2,776	3,950
Massachusetts	5,800	4,000	6,000	3,300	1,048	1,420
Rhode Island	550	350	500	300	102	130
Connecticut	4,500	3,500	4,000	2,340	786	1,170
New York	55,000	55,500	61,000	43,600	18,701	25,400
New Jersey	7,000	4,500	8,000	3,760	1,636	2,020
Pennsylvania	60,000	61,600	67,000	46,100	20,428	27,000
Delaware	1,750	1,090	2,200	960	525	650
Maryland	14,000	11,340	13,000	8,460	3,614	4,420
NORTHEAST	**172,000**	**160,530**	**187,000**	**123,600**	**51,599**	**69,000**
Ohio	70,000	65,500	86,000	53,500	20,268	25,800
Indiana	64,000	51,500	71,000	39,300	12,503	15,800
Illinois	106,000	71,700	86,000	51,200	18,793	22,400
Iowa	115,000	106,600	127,000	85,800	19,636	26,250
Missouri	80,000	85,700	50,000	50,200	17,228	24,200
CORN BELT	**435,000**	**381,000**	**420,000**	**280,000**	**88,428**	**114,450**
Michigan	48,000	49,200	85,000	41,300	15,924	19,860
Wisconsin	93,000	105,500	115,000	86,100	36,232	50,500
Minnesota	96,000	98,200	108,000	83,500	22,979	29,100
LAKE STATES	**237,000**	**252,900**	**308,000**	**210,900**	**75,135**	**99,460**
North Dakota	42,000	41,000	26,000	22,100	5,971	6,500
South Dakota	44,000	47,500	31,000	22,200	4,445	4,830
Nebraska	61,000	57,500	41,000	34,200	9,225	11,650
Kansas	62,000	56,000	42,000	35,400	9,247	12,800
GREAT PLAINS	**209,000**	**202,000**	**140,000**	**113,900**	**28,888**	**35,780**
West Virginia	14,000	18,800	8,000	9,350	3,484	4,420
Kentucky	48,000	50,700	28,000	30,400	14,718	19,500
Tennessee	47,000	54,500	25,500	24,000	12,037	15,500
Virginia	28,000	33,500	25,500	23,500	8,714	11,670
North Carolina	27,000	32,800	15,000	15,500	6,824	8,560
APPALACHIAN	**164,000**	**190,300**	**102,000**	**102,750**	**45,777**	**59,650**
South Carolina	12,500	10,550	7,500	5,890	2,471	3,150
Georgia	23,000	19,600	12,000	10,450	6,383	7,720
Florida	7,500	3,950	2,200	1,900	4,000	4,620
Alabama	19,000	17,900	7,300	7,480	5,367	6,600
SOUTHEAST	**62,000**	**52,000**	**29,000**	**25,720**	**18,221**	**22,090**
Mississippi	21,000	22,900	5,000	9,750	5,282	6,430
Louisiana	12,000	11,600	6,000	6,120	4,421	5,030
Arkansas	24,000	22,100	12,000	10,340	5,521	7,800
DELTA STATES	**57,000**	**56,600**	**23,000**	**26,210**	**15,224**	**19,260**
Oklahoma	37,000	33,700	22,000	19,500	7,703	11,000
Texas	48,000	49,200	21,000	22,500	19,487	25,800
SOUTHERN PLAINS	**85,000**	**82,900**	**43,000**	**42,000**	**27,190**	**36,800**
Montana	23,000	22,600	15,000	13,680	3,205	3,740
Idaho	27,000	22,200	23,000	16,300	3,367	3,970
Wyoming	10,500	6,350	6,000	5,120	1,179	1,500
Colorado	24,000	16,700	25,000	14,520	2,712	3,370
New Mexico	8,000	4,920	8,000	4,180	1,005	1,150
Arizona	4,500	2,100	3,700	1,390	427	465
Utah	11,700	11,700	12,000	9,240	2,257	3,125
Nevada	2,300	1,650	2,300	1,490	384	420
MOUNTAIN STATES	**111,000**	**88,220**	**95,000**	**65,920**	**14,536**	**17,740**
Washington	27,000	22,450	16,000	13,300	4,218	5,100
Oregon	23,000	21,000	15,000	11,800	3,634	4,820
California	33,000	25,100	22,000	13,900	3,590	3,850
PACIFIC	**83,000**	**68,550**	**53,000**	**39,000**	**11,442**	**13,770**
TOTAL	**1,615,000**	**1,535,000**	**1,400,000**	**1,030,000**	**376,440**	**488,000**

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[1] Does not include windrowers with conditioning rolls.

Principal Machines on Farms—1980

STATE	POWER ELEVATORS Estimated Jan. 1, 1951 Number	POWER ELEVATORS Estimated Jan. 1, 1958 Number	POWER ELEVATORS Estimated July 1, 1980 Number	Manure Spreaders Estimated July 1, 1980 Number	Corn and Cotton Planters Estimated July 1, 1980 Number	Grain Drills Estimated July 1, 1980 Number
Maine			4,750	3,150	320	800
New Hampshire			2,230	1,950	280	60
Vermont	1,200	12,000	7,150	6,180	1,550	310
Massachusetts			3,220	2,310	860	110
Rhode Island			460	280	100	30
Connecticut			3,750	2,320	1,000	80
New York	7,200	35,000	62,300	39,500	19,200	25,200
New Jersey	2,000	5,500	5,500	2,440	2,330	2,300
Pennsylvania	9,600	38,000	66,300	41,500	32,300	38,000
Delaware	500	2,000	3,510	1,750	2,060	1,900
Maryland	2,500	7,500	14,600	8,450	8,300	8,500
NORTHEAST	**23,000**	**100,000**	**173,770**	**109,830**	**68,300**	**77,290**
Ohio	27,000	68,000	113,500	56,600	62,000	60,000
Indiana	30,000	66,000	112,700	50,600	63,500	48,800
Illinois	61,000	110,000	172,000	74,000	92,500	61,300
Iowa	80,000	122,000	180,500	100,400	103,000	57,300
Missouri	15,000	41,000	80,300	57,400	49,000	49,500
CORN BELT	**213,000**	**407,000**	**659,000**	**339,000**	**370,000**	**276,900**
Michigan	14,000	45,000	80,600	37,000	37,500	48,500
Wisconsin	15,000	48,000	127,000	84,000	66,000	61,500
Minnesota	46,000	90,000	142,000	77,300	79,500	71,500
LAKE STATES	**75,000**	**183,000**	**349,600**	**198,300**	**183,000**	**181,500**
North Dakota	28,000	45,000	68,800	20,970	15,000	56,500
South Dakota	24,000	40,000	61,200	29,300	30,100	32,000
Nebraska	36,000	60,000	94,800	45,200	44,500	41,000
Kansas	25,000	55,000	101,200	38,000	21,900	67,200
GREAT PLAINS	**113,000**	**200,000**	**326,000**	**133,470**	**111,500**	**196,700**
West Virginia	500	3,000	6,080	8,470	5,150	3,500
Kentucky	2,500	10,000	23,500	28,300	38,000	10,900
Tennessee	1,000	6,500	14,430	20,750	51,300	13,600
Virginia	2,000	11,000	18,200	22,100	25,800	16,500
North Carolina	1,000	7,500	19,600	21,400	72,500	22,000
APPALACHIAN	**7,000**	**38,000**	**81,810**	**101,020**	**192,750**	**66,500**
South Carolina	300	2,000	4,450	4,040	30,500	11,400
Georgia	900	6,000	13,300	6,740	38,500	9,800
Florida	300	1,500	3,530	1,170	5,900	1,700
Alabama	500	4,500	10,900	4,570	42,000	6,900
SOUTHEAST	**2,000**	**14,000**	**32,180**	**16,520**	**116,900**	**29,800**
Mississippi	700	4,500	7,470	5,160	52,300	8,100
Louisiana	400	1,000	2,450	2,950	19,600	7,300
Arkansas	900	4,500	9,150	7,200	21,500	13,000
DELTA STATES	**2,000**	**10,000**	**19,070**	**15,310**	**93,400**	**28,400**
Oklahoma	6,000	12,000	24,400	9,250	9,200	31,500
Texas	9,000	23,000	38,700	17,480	55,000	49,000
SOUTHERN PLAINS	**15,000**	**35,000**	**63,100**	**26,730**	**64,200**	**80,500**
Montana	7,500	17,500	27,000	10,900	1,090	21,000
Idaho	3,100	13,300	23,700	13,700	2,650	15,500
Wyoming	700	2,500	4,850	4,750	970	4,100
Colorado	7,000	13,000	24,300	14,100	6,200	15,500
New Mexico	500	1,500	2,500	2,310	3,150	1,930
Arizona	100	700	1,750	970	1,930	1,420
Utah	700	5,000	9,750	7,500	1,700	5,440
Nevada	400	500	920	1,100	60	320
MOUNTAIN STATES	**20,000**	**54,000**	**94,770**	**55,330**	**17,750**	**65,210**
Washington	2,000	8,000	21,000	14,550	1,850	12,500
Oregon	3,000	8,000	17,000	12,720	1,150	11,700
California	4,000	13,000	22,700	15,220	9,200	9,000
PACIFIC	**9,000**	**29,000**	**60,700**	**42,490**	**12,200**	**33,200**
TOTAL	**479,000**	**1,070,000**	**1,860,000**	**1,038,000**	**1,230,000**	**1,036,000**

Principal Machines on Farms—1980

STATE	MOTOR TRUCKS						Internal Combustion Engines[2] Estimated July 1, 1980 Number	Chain Saws Estimated July 1, 1980 Number
	1954 Adj. Cen. 1,000's[1]	1959 Census 1,000's	1964 Census 1,000's	1969 Census 1,000's	1974 Census 1,000's	Estimated July 1, 1980 1,000's		
Maine	18.1	17.3	14.8	12.1	11.3	10.8	1,450	7,500
New Hampshire	8.3	6.8	5.6	4.0	3.7	3.5	1,350	2,500
Vermont	11.1	10.0	8.1	6.1	6.2	6.1	1,900	6,200
Massachusetts	14.3	12.3	10.6	8.4	7.7	7.2	1,950	4,550
Rhode Island	1.9	1.9	1.8	1.2	1.2	1.2	200	630
Connecticut	13.2	11.0	9.9	7.4	6.2	5.4	1,700	3,800
New York	70.5	66.5	62.9	53.6	53.6	53.0	22,500	49,850
New Jersey	24.4	20.9	17.3	14.3	12.9	12.2	2,500	6,000
Pennsylvania	71.0	71.4	69.5	57.3	55.5	54.5	22,000	43,530
Delaware	5.2	5.3	5.2	5.1	5.7	6.1	1,000	2,520
Maryland	22.0	21.2	21.3	19.5	21.3	22.2	4,900	12,200
NORTHEAST	**260.0**	**244.6**	**227.0**	**189.0**	**185.3**	**182.2**	**61,450**	**139,280**
Ohio	77.0	81.5	91.4	93.7	97.8	100.7	21,000	60,700
Indiana	77.4	88.2	99.0	100.1	103.9	106.5	21,700	65,600
Illinois	99.9	113.7	120.9	129.3	139.9	145.5	32,000	71,200
Iowa	84.3	99.8	106.7	121.4	137.1	146.5	34,000	56,500
Missouri	95.8	109.7	123.0	132.5	134.0	134.8	34,700	94,500
CORN BELT	**434.4**	**492.9**	**541.0**	**577.0**	**612.7**	**634.0**	**143,400**	**348,500**
Michigan	70.5	75.7	80.5	74.6	73.6	72.6	19,400	45,600
Wisconsin	87.0	90.6	97.0	89.0	92.3	93.5	36,000	92,500
Minnesota	90.0	103.4	112.5	116.9	130.1	137.4	50,000	66,000
LAKE STATES	**247.5**	**269.7**	**290.0**	**280.5**	**296.0**	**303.5**	**105,400**	**204,100**
North Dakota	66.8	75.5	81.6	91.2	101.3	105.0	37,000	4,300
South Dakota	47.7	52.3	56.5	57.8	65.1	68.1	25,000	3,300
Nebraska	72.0	83.4	93.1	96.4	108.5	115.8	33,500	14,000
Kansas	112.1	122.3	134.0	141.3	150.9	157.5	44,000	23,200
GREAT PLAINS	**298.6**	**333.5**	**365.2**	**386.7**	**425.8**	**446.4**	**139,500**	**44,800**
West Virginia	26.0	24.7	24.1	19.5	16.9	15.3	5,250	21,500
Kentucky	66.7	74.9	90.5	97.1	95.8	95.1	17,200	44,500
Tennessee	71.6	76.8	86.3	92.8	88.1	85.1	13,000	58,800
Virginia	57.5	58.0	59.2	55.9	55.5	54.5	12,600	48,800
North Carolina	84.5	91.1	101.1	99.3	93.5	89.8	16,600	87,500
APPALACHIAN	**306.3**	**325.5**	**361.2**	**364.6**	**349.8**	**339.8**	**64,650**	**261,100**
South Carolina	39.2	39.1	39.0	35.3	33.7	32.3	6,500	24,600
Georgia	76.2	72.8	76.6	70.9	69.2	67.7	13,500	34,000
Florida	36.6	36.4	40.6	37.8	40.1	41.8	13,000	7,750
Alabama	63.7	63.4	69.5	67.4	64.4	62.5	11,000	32,000
SOUTHEAST	**215.7**	**211.7**	**225.7**	**211.4**	**207.4**	**204.3**	**44,000**	**98,350**
Mississippi	76.2	71.5	75.1	66.4	60.5	57.3	10,700	37,800
Louisiana	47.3	47.2	51.3	44.7	41.6	39.6	12,000	20,700
Arkansas	76.2	73.2	80.6	71.4	69.5	68.0	14,400	31,700
DELTA STATES	**199.7**	**191.9**	**207.0**	**182.5**	**171.6**	**164.9**	**37,100**	**90,200**
Oklahoma	85.7	92.7	105.1	106.8	101.6	98.0	21,700	10,300
Texas	187.8	197.8	211.0	227.6	208.1	195.0	61,500	20,000
SOUTHERN PLAINS	**273.5**	**290.5**	**316.1**	**334.4**	**309.7**	**293.0**	**83,200**	**30,300**
Montana	48.5	52.8	58.2	58.3	61.9	63.7	19,500	12,250
Idaho	38.7	44.0	48.3	47.1	51.4	53.7	16,000	13,600
Wyoming	15.0	16.2	17.7	18.4	19.2	19.8	6,400	3,310
Colorado	48.5	51.7	55.9	55.5	56.9	58.0	20,200	6,250
New Mexico	21.3	20.3	23.4	18.8	20.0	20.6	7,700	3,130
Arizona	13.5	16.8	17.2	12.1	14.4	16.2	5,100	530
Utah	18.0	18.8	20.3	18.3	19.4	20.5	6,600	2,470
Nevada	3.9	4.5	4.5	5.0	5.4	5.7	1,500	630
MOUNTAIN STATES	**207.4**	**225.1**	**245.5**	**233.5**	**248.6**	**258.2**	**83,000**	**42,170**
Washington	55.4	60.2	64.2	56.7	57.1	57.4	16,800	23,500
Oregon	47.7	48.9	53.6	46.2	49.6	51.8	21,500	26,700
California	128.8	131.0	126.1	115.7	118.8	121.5	63,000	33,000
PACIFIC	**231.9**	**240.1**	**243.9**	**218.6**	**225.5**	**230.7**	**101,300**	**83,200**
TOTAL	**2,675.0**	**2,825.5**	**3,022.6**	**2,978.2**	**3,032.4**	**3,057.0**	**863,000**	**1,342,000**

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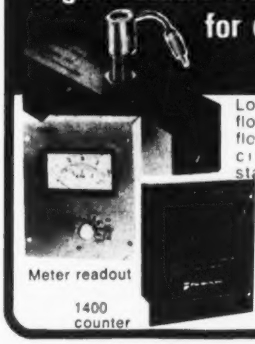
[1] Census numbers have been adjusted to bring them more in line with 1959 and later data based on the new definition of a farm.

[2] Includes engines used for stationary work such as irrigation, auxiliary engines on combines, balers, etc., and a small number of power units not elsewhere classified.

High Pressure Flow Meter for oils, fuels, liquids



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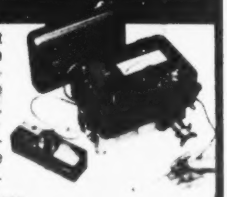

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State	40-49	50-59	60-69	70-79	80-89	90-99	100-119
Alabama	717	361	272	136	285	54	264
Arizona	75	36	56	46	74	26	113
Arkansas	848	407	301	69	141	23	126
California	668	794	1,045	490	487	84	329
Colorado	101	79	94	28	62	20	98
Connecticut	34	37	52	17	15	5	12
Delaware	26	35	48	4	25	.....	35
Florida	403	288	522	248	298	60	181
Georgia	761	330	409	212	319	67	301
Idaho	70	102	138	33	139	31	163
Illinois	311	310	477	319	393	78	808
Indiana	273	301	362	195	346	35	521
Iowa	147	215	619	382	654	159	1,562
Kansas	127	118	217	131	225	89	616
Kentucky	1,130	959	671	336	448	60	240
Louisiana	536	241	272	92	106	21	125
Maine	50	51	41	9	22	5	33
Maryland	161	105	125	42	85	31	114
Massachusetts	26	43	41	9	9	7	6
Michigan	332	364	426	194	308	79	392
Minnesota	126	245	742	321	625	136	1,150
Mississippi	611	332	272	128	252	23	203
Missouri	566	582	697	334	519	106	581
Montana	55	75	113	48	109	21	139
Nebraska	44	61	169	67	265	119	880
Nevada	13	21	15	3	19	1	13
N. Hampshire	55	38	24	5	7	4	5
New Jersey	68	50	47	18	51	3	23
New Mexico	86	46	27	21	23	6	62
New York	330	351	577	203	423	85	394
North Carolina	1,092	538	513	255	513	68	306
North Dakota	33	45	70	42	85	30	371
Ohio	519	498	594	246	470	88	613
Oklahoma	569	251	246	99	225	68	453
Oregon	313	259	167	64	114	26	116
Pennsylvania	340	375	489	144	376	65	316
Rhode Island	10	6	5	1	2	1	1
South Carolina	455	228	214	148	173	27	133
South Dakota	22	43	135	58	159	59	587
Tennessee	1,026	622	429	220	337	50	270
Texas	1,990	985	934	482	732	101	788
Utah	84	141	121	29	99	18	93
Vermont	39	75	100	31	73	5	31
Virginia	742	415	358	140	299	45	218
Washington	510	458	205	47	120	29	79
West Virginia	257	153	94	20	40	5	15
Wisconsin	206	479	1,167	498	852	125	1,063
Wyoming	26	57	52	21	54	12	67
Alaska	7	13	3	.....	1	.....	.....
Hawaii	25	8	7	3	1	3	3
U.S. Government	29	.....	14	102	.....	7	2
Miscellaneous	11	6	.....	.....	1	5	8
TOTAL	17,055	12,632	14,788	6,790	11,460	2,275	15,022

1979 Retail Sales of Farm Wheel Tractors by PTO Horsepower and State

(in units)

Two-Wheel-Drive Tractors							Four-Wheel-Drive Tractors					
120-129	130-139	140-149	150-159	160-179	180 & over	Total 2-Wheel Drive	Under 200	200-249	250 & over	Total 4-Wheel Drive	All Farm Wheel Tractors	State
40	285	50	81	51	58	2,654	16	20	12	48	2,702	Alabama
16	87	17	52	24	65	687	23	64	23	110	797	Arizona
62	495	209	372	227	428	3,708	58	196	51	305	4,013	Arkansas
63	296	48	140	95	136	4,675	111	222	80	413	5,088	California
25	233	46	104	47	72	1,009	77	78	29	184	1,193	Colorado
1	10	2	1	1	.....	187	2	.....	.....	2	189	Connecticut
11	31	3	7	5	6	236	5	11	3	19	255	Delaware
18	132	17	30	25	25	2,247	29	57	8	94	2,341	Florida
90	633	123	164	91	163	3,663	7	31	16	54	3,717	Georgia
56	189	53	75	20	14	1,083	63	87	30	180	1,263	Idaho
241	1,858	428	568	439	490	6,720	404	388	139	931	7,651	Illinois
154	1,046	224	291	260	270	4,278	235	231	106	572	4,850	Indiana
348	2,732	741	546	398	364	8,867	408	311	85	804	9,671	Iowa
286	1,095	200	379	318	361	4,162	285	321	56	662	4,824	Kansas
37	260	29	73	52	74	4,369	52	48	10	110	4,479	Kentucky
38	227	178	205	173	312	2,526	60	112	32	204	2,730	Louisiana
1	14	.....	1	.....	.....	227	2	.....	.....	2	229	Maine
17	66	19	13	9	13	800	17	14	11	42	842	Maryland
.....	2	.....	1	.....	.....	144	.....	.....	.....	.....	144	Massachusetts
75	491	75	80	78	65	2,959	154	112	31	297	3,256	Michigan
238	1,520	278	318	234	174	6,107	530	361	98	989	7,096	Minnesota
53	438	137	358	232	321	3,360	36	85	60	181	3,541	Mississippi
208	878	185	238	178	203	5,275	122	127	51	300	5,575	Missouri
51	150	19	57	31	43	911	178	193	76	447	1,358	Montana
215	1,418	394	359	218	209	4,418	164	138	40	342	4,760	Nebraska
.....	20	.....	12	2	4	123	7	2	2	11	134	Nevada
.....	5	.....	.....	1	.....	145	1	.....	.....	1	146	N. Hampshire
4	23	7	3	6	3	306	8	.....	1	9	315	New Jersey
6	93	9	21	16	20	436	11	14	2	27	463	New Mexico
45	243	33	24	17	11	2,736	99	34	11	144	2,880	New York
57	287	82	77	66	91	3,945	34	25	18	77	4,022	North Carolina
188	749	204	238	172	194	2,421	477	517	147	1,141	3,562	North Dakota
144	768	187	133	155	161	4,576	213	163	52	428	5,004	Ohio
147	752	92	172	176	134	3,384	180	247	35	462	3,846	Oklahoma
22	112	24	35	22	10	1,284	57	30	14	101	1,385	Oregon
46	180	24	17	24	14	2,407	30	13	4	47	2,454	Pennsylvania
.....	.....	.....	.....	.....	.....	26	.....	.....	.....	.....	26	Rhode Island
29	192	40	56	39	71	1,805	18	17	11	46	1,851	South Carolina
142	681	131	156	112	67	2,352	205	123	32	360	2,712	South Dakota
55	409	81	131	93	158	3,881	23	31	29	83	3,964	Tennessee
262	1,881	493	502	481	512	10,143	243	302	96	641	10,784	Texas
16	57	10	13	7	5	693	8	8	2	18	711	Utah
5	23	7	.....	5	.....	394	10	.....	.....	10	404	Vermont
29	157	25	20	20	27	2,495	7	8	6	21	2,516	Virginia
7	112	10	49	12	11	1,649	71	98	33	202	1,851	Washington
3	6	.....	1	.....	.....	594	.....	.....	.....	.....	594	West Virginia
185	736	158	111	85	103	5,768	183	68	31	282	6,050	Wisconsin
17	76	11	13	8	5	419	20	16	7	43	462	Wyoming
1	.....	.....	.....	2	.....	27	.....	1	.....	1	28	Alaska
.....	.....	1	1	.....	.....	52	.....	.....	4	4	56	Hawaii
.....	1	.....	.....	.....	.....	155	.....	.....	.....	.....	155	U.S. Government
.....	7	2	3	1	1	45	1	2	1	4	49	Miscellaneous
3,754	**22,156**	**5,106**	**6,301**	**4,728**	**5,468**	**127,535**	**4,944**	**4,926**	**1,585**	**11,455**	**138,990**	**TOTAL**

DATA: Farm & Industrial Equipment Institute. Figures do not include garden tractors, motor tillers, or contractor's off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland, Satoh); Allis-Chalmers; Belarus; J I Case; Deere; Deutz; Ford; International Harvester; Long; Massey-Ferguson; Rome Industries; Steiger; Versatile; R. M. Wade (Satoh); and White. Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

RETAIL SALES OF SELECTED FARM EQUIPMENT—Jan.-Dec., 1978 and 1979 (1)

(In Units)

	Combines Self-Propelled		Corn Heads		Hay Balers (2)		Windrowers Self-Propelled				Grinder-Mixers		Shear-Bar Forage Harvesters (3)	
							Power Units		Total Heads					
	1978	1979	1978	1979	1978	1979	1978	1979	1978	1979	1978	1979	1978	1979
Alabama	539	504	161	107	378	252	1	1	1	1	220	231	64	63
Arizona	47	35	10	5	36	43	77	63	82	69	7	4	10	16
Arkansas	1,045	1,123	6	11	524	427	2	2	1	1	65	62	21	28
California	253	237	75	65	210	244	302	300	322	327	6	15	84	80
Colorado	249	316	132	166	422	507	257	284	257	289	54	70	162	195
Connecticut	1	2	2	1	76	67	1	.....	1	.....	1	2	40	68
Delaware	50	55	40	37	34	18	3	.....	3	.....	7	12	14	15
Florida	165	148	93	76	140	113	.....	3	.....	3	69	64	34	26
Georgia	725	764	575	532	365	244	5	1	5	1	520	542	139	133
Idaho	360	371	15	12	530	505	302	357	311	369	30	48	64	74
Illinois	3,600	3,305	3,549	3,533	414	399	30	15	30	15	748	679	354	365
Indiana	2,048	1,964	2,075	2,095	498	422	17	12	17	12	599	605	281	263
Iowa	3,665	3,474	3,866	4,191	486	459	265	262	272	257	1,893	2,062	954	930
Kansas	1,605	1,851	384	425	448	495	359	411	367	421	314	363	283	348
Kentucky	508	579	411	412	669	455	5	3	5	4	302	345	258	235
Louisiana	657	650	8	2	184	164	1	.....	1	.....	15	17	24	26
Maine	8	2	.....	.....	94	89	.....	3	.....	3	.....	1	36	63
Maryland	171	161	175	171	169	137	12	8	13	7	46	51	88	123
Massachusetts	.....	.....	1	.....	61	59	1	1	1	.....	4	1	32	38
Michigan	562	609	532	592	583	483	72	81	72	85	270	273	527	
Minnesota	2,110	2,085	1,813	2,004	1,111	971	859	781	888	804	725	918	1,096	1,199
Mississippi	806	891	20	10	262	209	.....	.....	.....	.....	76	70	71	76
Missouri	1,575	1,676	868	939	751	685	92	87	96	89	583	667	205	217
Montana	456	393	1	5	464	413	569	511	624	551	65	87	68	48
Nebraska	1,738	1,845	1,605	1,816	278	257	457	518	474	525	522	633	428	486
Nevada	7	4	.....	.....	52	59	66	76	71	77	1	2	7	6
New Hampshire	.....	.....	.....	.....	55	59	1	1	1	1	.....	2	29	39
New Jersey	68	48	32	17	78	65	3	.....	3	.....	12	14	38	32
New Mexico	21	32	9	12	187	166	98	99	97	99	13	19	9	11
New York	171	179	204	287	882	812	83	74	85	74	174	133	913	1,054
North Carolina	591	662	544	530	569	327	2	3	2	3	252	257	143	141
North Dakota	1,182	1,383	67	86	145	96	1,063	922	1,130	986	124	194	144	155
Ohio	1,655	1,654	1,450	1,582	904	709	17	14	17	14	498	538	356	391
Oklahoma	461	620	22	15	743	907	152	168	155	172	141	187	39	61
Oregon	248	220	15	13	389	335	348	260	365	265	25	37	95	87
Pennsylvania	272	283	303	305	1,141	977	88	89	87	90	323	350	689	789
Rhode Island	.....	.....	.....	.....	6	6	.....	.....	.....	.....	.....	1	7	1
South Carolina	355	384	199	194	178	102	.....	.....	.....	.....	120	127	41	38
South Dakota	712	725	497	540	272	183	821	784	863	842	340	429	415	485
Tennessee	686	692	254	223	804	610	2	1	2	1	281	289	227	229
Texas	897	966	276	278	1,369	1,445	98	119	104	132	231	270	60	86
Utah	49	41	13	15	339	329	156	156	159	158	70	78	94	97
Vermont	.....	.....	2	.....	132	132	2	1	2	1	2	3	131	177
Virginia	216	259	181	221	610	488	9	7	9	7	145	165	283	259
Washington	328	381	24	71	367	348	187	213	191	226	29	20	130	104
West Virginia	4	3	5	6	373	263	.....	.....	.....	.....	32	36	56	58
Wisconsin	575	611	669	755	2,069	1,988	377	397	381	401	570	661	2,303	2,457
Wyoming	52	52	13	16	229	214	188	203	198	212	18	33	36	52
Alaska	.....	6	.....	.....	6	9	.....	.....	.....	.....	.....	.....	1	.....
Hawaii	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	1	.....
U.S. Government	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous (4)	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	6	.....	.....
TOTAL	31,494	32,246	21,196	22,374	21,086	18,750	7,450	7,291	7,763	7,594	10,544	11,673	11,523	12,451

Data released Feb. 21, 1980, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled.
(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

Mower Conditioners All Types 1978	Mower Conditioners All Types 1979	Manure Spreaders Conveyor-Type 1978	Manure Spreaders Conveyor-Type 1979	
264	242	20	18	........Alabama
4	6	9	9	.........Arizona
520	574	101	115	........Arkansas
54	49	69	86	........California
125	166	42	71	........Colorado
93	90	86	85	.....Connecticut
31	18	64	73	........Delaware
141	124	28	30	..........Florida
340	279	36	51	.........Georgia
135	123	144	137	...........Idaho
782	773	1,126	916	..........Illinois
728	709	766	717	..........Indiana
,501	1,480	2,409	2,391	............Iowa
715	1,010	219	263	..........Kansas
,235	1,217	303	316	........Kentucky
118	126	21	26	........Louisiana
115	121	116	119	...........Maine
174	182	242	230	........Maryland
86	81	67	76	...Massachusetts
949	786	828	824	........Michigan
,309	1,474	1,849	1,995	.......Minnesota
202	198	28	31	......Mississippi
,627	1,787	384	441	........Missouri
137	129	64	50	........Montana
462	623	442	549	........Nebraska
3	12	7	7	..........Nevada
83	70	62	53	..New Hampshire
97	80	58	63	......New Jersey
38	38	3	8	.....New Mexico
,258	1,265	1,732	1,649	........New York
489	389	171	166	...North Carolina
131	172	190	114	....North Dakota
,284	1,121	1,028	1,033	............Ohio
705	960	29	36	.......Oklahoma
251	201	107	135	..........Oregon
,329	1,252	1,367	1,429	.....Pennsylvania
6	6	3	1	....Rhode Island
174	141	32	32	...South Carolina
122	147	305	362	....South Dakota
866	943	162	188	.......Tennessee
,367	1,548	136	153	...........Texas
191	168	157	106	............Utah
248	253	261	282	.........Vermont
676	762	247	261	.........Virginia
204	156	122	150	......Washington
228	250	88	99	....West Virginia
,208	3,202	3,132	3,103	.......Wisconsin
151	74	47	54	........Wyoming
1	2	1	1	..........Alaska
.....	1	.....	2	..........Hawaii
.....	.....	.....	.....	.U.S. Government
.....	.....	1	1	...Miscellaneous
4,957	25,600	18,913	19,107	........TOTAL

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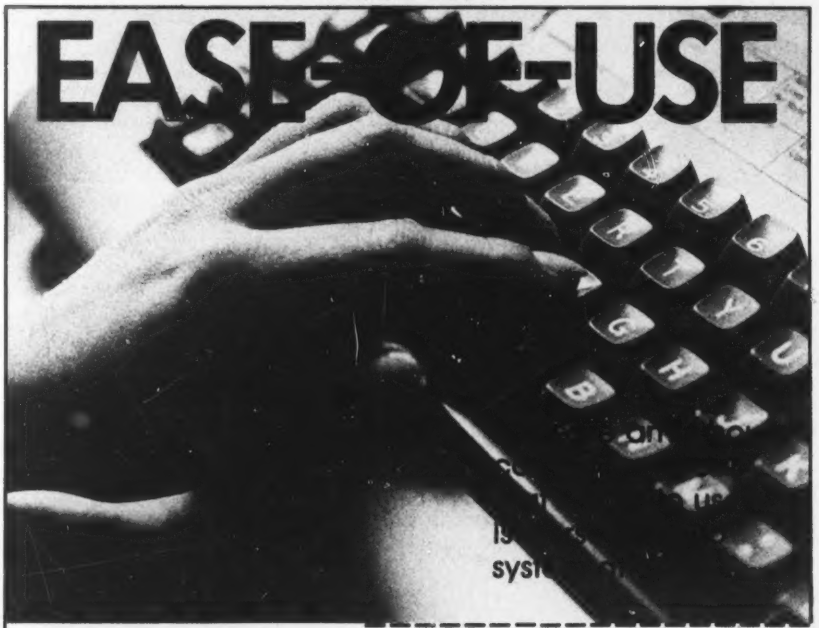

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RETAIL SALES OF WHEEL TRACTORS*

(In Units)

	Total Wheel Tractors†				Cumulative for Jan.-July, 1979				Cumulative for Jan.-July, 1980			
	July 1979		July 1980		Farm Type				Farm Type			
	Farm	Non-Farm	Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm
Alabama	154	45	180	28	1,825	29	1,854	403	1,481	51	1,532	236
Alaska	1	2	1	6	9	.....	9	25	11	6	17	19
Arizona	53	60	50	49	415	55	470	403	468	58	526	283
Arkansas	276	46	222	42	2,403	154	2,562	429	2,031	213	2,244	308
California	373	270	452	288	2,795	195	2,990	2,267	2,557	214	2,771	1,607
Colorado	77	50	151	69	636	109	745	421	662	118	780	391
Connecticut	12	18	24	17	124	.....	124	167	167	3	170	117
Delaware	23	7	8	8	157	11	168	36	100	5	105	25
Florida	166	81	281	106	1,281	42	1,323	1,086	1,466	46	1,512	691
Georgia	190	72	307	64	2,565	27	2,592	567	2,040	33	2,073	321
Hawaii	7	9	8	3	36	4	40	61	36	1	37	58
Idaho	78	18	117	11	635	95	730	122	620	73	693	87
Illinois	278	107	406	78	4,336	461	4,797	1,059	2,871	446	3,317	479
Indiana	186	80	305	39	2,730	283	3,013	598	1,775	271	2,046	289
Iowa	405	36	474	15	5,845	366	6,211	293	3,248	329	3,577	172
Kansas	377	51	458	29	2,436	385	2,821	236	2,024	433	2,457	217
Kentucky	273	70	355	42	3,050	56	3,106	523	2,563	45	2,608	292
Louisiana	178	66	255	52	1,598	101	1,699	564	1,667	162	1,829	362
Maine	19	16	44	4	135	1	136	94	152	2	154	56
Maryland	53	41	45	27	537	23	560	325	428	24	452	188
Massachusetts	11	26	30	27	96	.....	96	208	99	.....	99	155
Michigan	154	107	220	88	1,811	152	1,963	888	1,392	138	1,530	486
Minnesota	343	52	325	21	3,925	565	4,490	473	2,157	329	2,486	236
Mississippi	221	32	245	43	2,270	83	2,353	429	2,050	167	2,217	235
Missouri	301	88	312	50	3,464	160	3,624	608	2,305	144	2,449	355
Montana	123	10	150	24	595	294	889	121	708	166	874	138
Nebraska	207	40	226	16	2,947	197	3,144	179	1,947	225	2,172	107
Nevada	9	11	17	10	87	3	90	121	77	7	84	78
New Hampshire	16	5	11	14	82	1	83	73	82	.....	82	54
New Jersey	15	52	28	55	209	5	214	438	184	2	186	293
New Mexico	40	25	32	24	301	19	320	182	266	15	281	137
New York	193	86	267	100	1,627	68	1,695	728	1,498	61	1,559	542
North Carolina	208	56	281	67	2,712	48	2,760	632	2,054	31	2,085	389
North Dakota	202	17	138	11	1,614	784	2,398	150	797	419	1,216	82
Ohio	233	105	299	82	2,909	220	3,129	1,094	2,194	213	2,407	516
Oklahoma	480	65	420	97	2,073	263	2,336	451	1,633	238	1,871	379
Oregon	128	46	148	30	751	40	791	354	810	43	853	224
Pennsylvania	173	97	194	111	1,526	27	1,553	903	1,344	36	1,380	631
Rhode Island	3	.....	2	1	15	.....	15	27	11	.....	11	27
South Carolina	120	24	111	44	1,273	24	1,297	301	965	32	997	213
South Dakota	140	18	165	5	1,548	207	1,755	132	868	139	1,007	52
Tennessee	258	79	273	62	2,760	48	2,808	606	1,964	57	2,021	258
Texas	895	343	1,072	345	5,980	309	6,289	2,542	5,725	355	6,080	2,131
Utah	67	39	52	34	410	10	420	283	383	17	400	197
Vermont	26	7	53	5	227	5	232	49	201	.....	201	21
Virginia	176	48	178	54	1,611	7	1,618	468	1,371	19	1,390	343
Washington	142	62	195	32	1,004	117	1,121	556	1,095	98	1,193	260
West Virginia	56	16	45	20	376	.....	376	145	316	.....	316	126
Wisconsin	298	51	393	53	3,817	135	3,952	493	2,803	122	2,925	292
Wyoming	43	24	44	17	273	23	296	157	204	24	228	100
U.S. Government	10	11	68	154	59	.....	59	460	138	.....	136	537
Miscellaneous‡	1	134	38	60	43	3	46	918	228	.....	228	424
TOTAL	**8,471**	**2,921**	**10,175**	**2,735**	**81,948**	**6,214**	**88,162**	**24,849**	**64,236**	**5,630**	**69,866**	**16,219**

Data released September 26, 1980. Farm & Industrial Equipment Institute.

*Figures do not include garden tractors, motor tillers or contractors off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland Satoh); Allis-Chalmers; Belarus; J I Case; Deere; Deutz; Ford; International Harvester; Long; Massey-Ferguson; R. M. Wade (Satoh); Steiger; Versatile; and White.

‡Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

RETAIL SALES OF SELECTED FARM EQUIPMENT — Jan.-July, 1979 and 1980 (1)

(In Units)

	Combines Self-Propelled		Corn Heads		Hay Balers (2)		Windrowers Self-Propelled: Power Units		Windrowers Self-Propelled: Total Heads		Grinder-Mixers		Shear-Bar Forage Harvesters (3)	
	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980
Alabama	119	85	32	22	147	87	.....	2	.....	1	148	88	25	6
Alaska	.....	2	.....	.....	3	10	.....	.....	.....	.....	.....	1	.....	.....
Arizona	18	34	.....	.....	24	28	40	47	43	57	4	6	8	6
Arkansas	208	185	1	.....	300	138	2	.....	1	.....	41	47	12	4
California	108	150	21	13	128	110	156	185	176	206	11	3	31	34
Colorado	172	189	38	46	274	242	175	132	178	142	49	44	36	31
Connecticut	1	.....	.....	.....	44	42	.....	.....	.....	.....	2	.....	14	11
Delaware	13	13	9	9	11	7	.....	1	.....	1	8	7	4	5
Florida	42	37	34	27	56	42	1	.....	1	.....	45	28	8	14
Georgia	241	174	169	121	160	110	1	1	1	1	339	176	49	37
Hawaii	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Idaho	135	99	4	8	296	403	221	240	222	239	25	37	19	34
Illinois	1,194	838	873	790	278	236	11	15	11	15	463	330	148	111
Indiana	683	501	543	522	291	203	7	6	7	6	426	241	96	85
Iowa	1,105	908	798	910	300	190	188	93	190	98	1,516	785	376	254
Kansas	1,118	1,144	80	135	345	207	282	204	290	206	245	160	103	101
Kentucky	177	115	85	70	345	202	3	3	4	3	232	223	62	57
Louisiana	169	110	.....	3	87	31	.....	.....	.....	.....	12	12	8	11
Maine	1	2	.....	.....	63	46	3	2	3	2	1	.....	23	17
Maryland	45	56	32	53	88	80	6	8	6	8	34	27	34	29
Massachusetts	.....	.....	.....	.....	30	33	1	6	.....	6	1	1	10	7
Michigan	208	145	124	124	271	210	49	41	51	42	181	157	206	176
Minnesota	669	461	437	350	620	464	444	349	454	358	682	372	488	341
Mississippi	199	155	3	1	102	46	.....	1	.....	1	38	25	29	29
Missouri	461	389	173	184	497	322	65	51	65	54	477	346	90	56
Montana	138	192	2	2	251	210	307	215	317	228	55	45	17	17
Nebraska	562	592	282	407	172	125	359	188	370	197	457	341	148	117
Nevada	.....	1	.....	.....	29	28	48	27	51	30	1	2	2	7
New Hampshire	.....	.....	.....	.....	29	40	.....	.....	.....	.....	2	.....	8	8
New Jersey	17	10	6	8	46	21	.....	.....	.....	.....	11	6	6	8
New Mexico	13	19	.....	5	69	82	64	42	64	44	17	9	3	.....
New York	43	44	50	67	477	471	42	44	42	45	83	81	288	318
North Carolina	177	116	97	102	240	204	3	2	3	2	166	104	31	30
North Dakota	517	357	10	14	59	29	529	236	553	248	141	89	40	38
Ohio	605	446	421	344	473	327	10	6	10	6	384	259	114	119
Oklahoma	372	355	2	6	647	306	125	77	128	83	111	84	28	16
Oregon	88	89	.....	4	215	292	149	149	150	157	26	19	41	22
Pennsylvania	111	69	68	84	652	491	56	38	55	40	237	202	248	235
Rhode Island	.....	.....	.....	.....	3	3	.....	.....	.....	.....	1	.....	.....	1
South Carolina	115	76	42	34	68	49	.....	.....	.....	.....	80	44	16	15
South Dakota	225	229	91	88	106	52	551	325	589	352	274	217	127	100
Tennessee	193	126	40	52	475	314	.....	1	.....	1	187	137	73	43
Texas	535	586	117	128	994	434	81	65	90	71	179	138	41	53
Utah	17	12	.....	1	200	228	87	71	88	72	55	21	28	29
Vermont	.....	.....	.....	.....	77	83	.....	2	.....	2	2	.....	54	65
Virginia	80	54	62	44	379	305	5	6	5	6	112	65	58	62
Washington	196	175	25	13	187	298	133	119	138	118	15	14	52	64
West Virginia	2	.....	3	.....	199	109	.....	.....	.....	.....	20	18	12	2
Wisconsin	99	141	111	173	1,257	917	259	234	262	236	456	344	1,061	938
Wyoming	23	25	2	1	131	107	97	96	103	96	19	14	10	10
U.S. Government	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous (4)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	.....
TOTAL	**11,215**	**9,506**	**4,887**	**4,966**	**12,215**	**9,014**	**4,560**	**3,330**	**4,721**	**3,480**	**8,073**	**5,369**	**4,385**	**3,775**

Data released September 26, 1980, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled.
(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

Mower Conditioners All Types 1979	Mower Conditioners All Types 1980	Manure Spreaders Conveyor-Type 1979	Manure Spreaders Conveyor-Type 1980	
161	95	11	15	Alabama
.....	2	1	1	Alaska
4	8	6	6	Arizona
431	258	86	70	Arkansas
37	30	53	26	California
98	95	53	49	Colorado
59	64	61	49	Connecticut
12	14	52	43	Delaware
53	33	17	19	Florida
181	164	34	33	Georgia
1	.....	1	1	Hawaii
74	96	80	69	Idaho
531	402	740	401	Illinois
505	329	524	314	Indiana
1,035	685	1,862	873	Iowa
696	374	201	152	Kansas
924	609	252	210	Kentucky
66	31	19	18	Louisiana
85	64	93	68	Maine
119	72	156	158	Maryland
52	36	51	49	Massachusetts
481	399	576	486	Michigan
1,046	681	1,355	816	Minnesota
109	53	23	11	Mississippi
1,326	892	356	232	Missouri
89	89	37	34	Montana
438	306	428	268	Nebraska
7	4	2	5	Nevada
36	47	39	40	New Hampshire
56	36	46	35	New Jersey
14	11	4	5	New Mexico
724	733	995	832	New York
273	172	119	104	North Carolina
136	70	82	66	North Dakota
783	526	771	545	Ohio
688	444	24	41	Oklahoma
137	197	76	71	Oregon
761	618	979	824	Pennsylvania
5	2	1	.....	Rhode Island
101	53	24	22	South Carolina
113	44	255	135	South Dakota
708	436	146	129	Tennessee
1,077	749	105	99	Texas
104	105	69	79	Utah
149	136	197	144	Vermont
570	539	171	158	Virginia
111	167	99	88	Washington
169	117	72	42	West Virginia
2,020	1,573	2,152	1,319	Wisconsin
27	23	42	29	Wyoming
.....	.....	.....	.....	U.S. Government
.....	.....	1	.....	Miscellaneous
17,382	12,683	13,599	9,283	TO[illegible]

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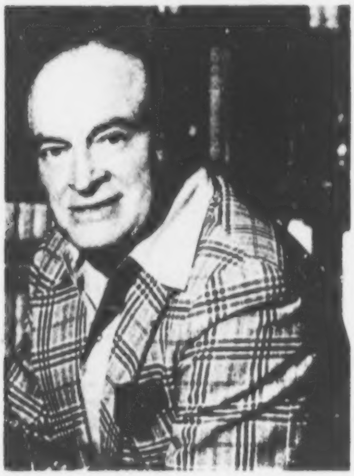

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PRODUCTION OF TRACTORS (In units)

Year	Wheel-type & Tracklaying	Wheel-type	Tracklaying	Garden Tractors† & Motor Tillers
1936-39 Avg.	222,161	197,445	24,716	9,095
1940-44 Avg.	249,336	217,874	31,463	12,987
1945-49 Avg.	442,648	404,230	38,419	126,121
1950	542,448	498,768	43,680	151,198
1951	617,060	567,446	49,614	177,169
1952	463,211	414,560	48,651	199,321
1953	442,247	390,385	51,862	245,609
1954*	285,159	245,755	39,404	191,235
1955	377,114	330,141	46,973	185,696
1956	272,265	214,654	57,611	200,997
1957	265,852	229,050	36,802	178,542
1958	265,495	241,269	24,226	227,073
1959	297,078	259,916	37,162	327,083
1960	178,500	152,187	26,313	416,455
1961	191,191	171,417	19,774	389,861
1962	207,281	188,101	19,180	421,833
1963	224,306	203,449	20,857	347,413
1964	240,579	213,221	27,358	416,486
1965	271,751	244,050	27,701	422,342
1966	299,114	270,687	28,427	507,606
1967	262,061	242,215	19,846	560,387
1968	236,023	213,199	22,824	583,265
1969	218,547	195,704	22,843	529,746
1970	191,679	171,603	20,076	498,372
1971	186,249	167,501	18,748	491,117
1972	218,213	196,988	21,225	662,583
1973	236,944	212,072	24,872	847,427
1974	233,825	210,074	23,751	1,287,026
1975	231,968	210,913	21,055	1,209,978
1976	213,154	193,724	19,430	858,727
1977	205,285	185,408	19,877	874,354
1978	197,343	175,205	22,138	918,866**
1979	223,849	204,228	19,621	NA

*Figures subsequent to 1954 exclude contractors' off-highway wheel type.

†Figures represent manufacturers' shipments subsequent to 1957. Production not available on comparable basis.

**Excludes walking-type tractors.

NA—Not Available.

Data: Current Industrial Reports: Series M35S and M35A. Bureau of the Census.

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Value of Shipments, 1974-1978

(in thousands of dollars)

I—Farm Machines and Equipment

	1978	1977	1976	1975	1974
Planting, Seeding and Fertilizing Machinery	499,070	550,782	516,847	480,273	354,436
Harrows, Rollers, Pulverizers, Stalk Cutters	466,621	465,974	478,322	476,274	394,993
Plows	190,844	239,151	266,660	250,134	182,301
Harvesting Machinery	1,782,295	1,599,722	1,435,307	1,253,430	1,093,207
Haying Machinery	522,370	469,715	508,250	481,334	407,652
Farm Dairy Machines and Equipment	109,116	97,347	77,087	68,037	80,309
Sprayers and Dusters	168,679	161,709	158,848	155,752	139,287
Farm Elevators and Blowers	148,002	114,691	87,611	100,404	91,952
Cultivators and Weeders	189,439	140,079	224,013	227,440	162,786
Machines for Preparing Crops for Market or Use	356,311	308,932	233,656	262,379	254,921
Farm Poultry Equipment	148,465	127,867	100,472	70,023	76,154
Hog Equipment	76,310	54,481	59,793	37,574	45,480
Other Barn and Barnyard Equipment	219,171	188,150	160,580	137,250	167,521
Garden Tractors, Motor Tillers	686,375	574,702	586,278	553,269	561,250
Farm Wagons, Other Farm Transportation Equipment (1)	203,212	183,934	173,130	178,577	186,204
TOTALS	**5,766,280**	**5,277,236**	**5,066,854**	**4,732,150**	**4,198,453**

Source: U.S. Dept. of Commerce, Bureau of the Census, Current Industrial Reports, Farm Machinery and Equipment (MA-35A).

II—Wheel Tractors and Attachments

	1978	1977	1976	1975	1974
Wheel Tractors, Farm Type	2,264,398	2,424,139	2,235,111	2,099,501	1,509,806
Wheel Tractors, Non-Farm (2)	132,694	115,458	93,876	118,531	160,688
Attachments for Wheel Tractors, Farm and Non-Farm	36,527	34,780	37,472	35,040	35,937
Parts for Wheel Tractors, Farm and Non-Farm	263,312	310,398	279,637	222,575	238,970
TOTALS	**2,696,931**	**2,884,775**	**2,646,096**	**2,475,647**	**1,945,401**

(1) Data for 1976, 1977 and 1978 include operator cabs in attachments and parts for these items.
(2) Industrial Type, excluding tractor chassis, shipped as a part of front engine mount, integral design tractor shovel loader/backhoes.
Source: U.S. Dept. of Commerce, Bureau of the Census, Current Industrial Reports, Tractors, Except Garden Tractors (M35S).

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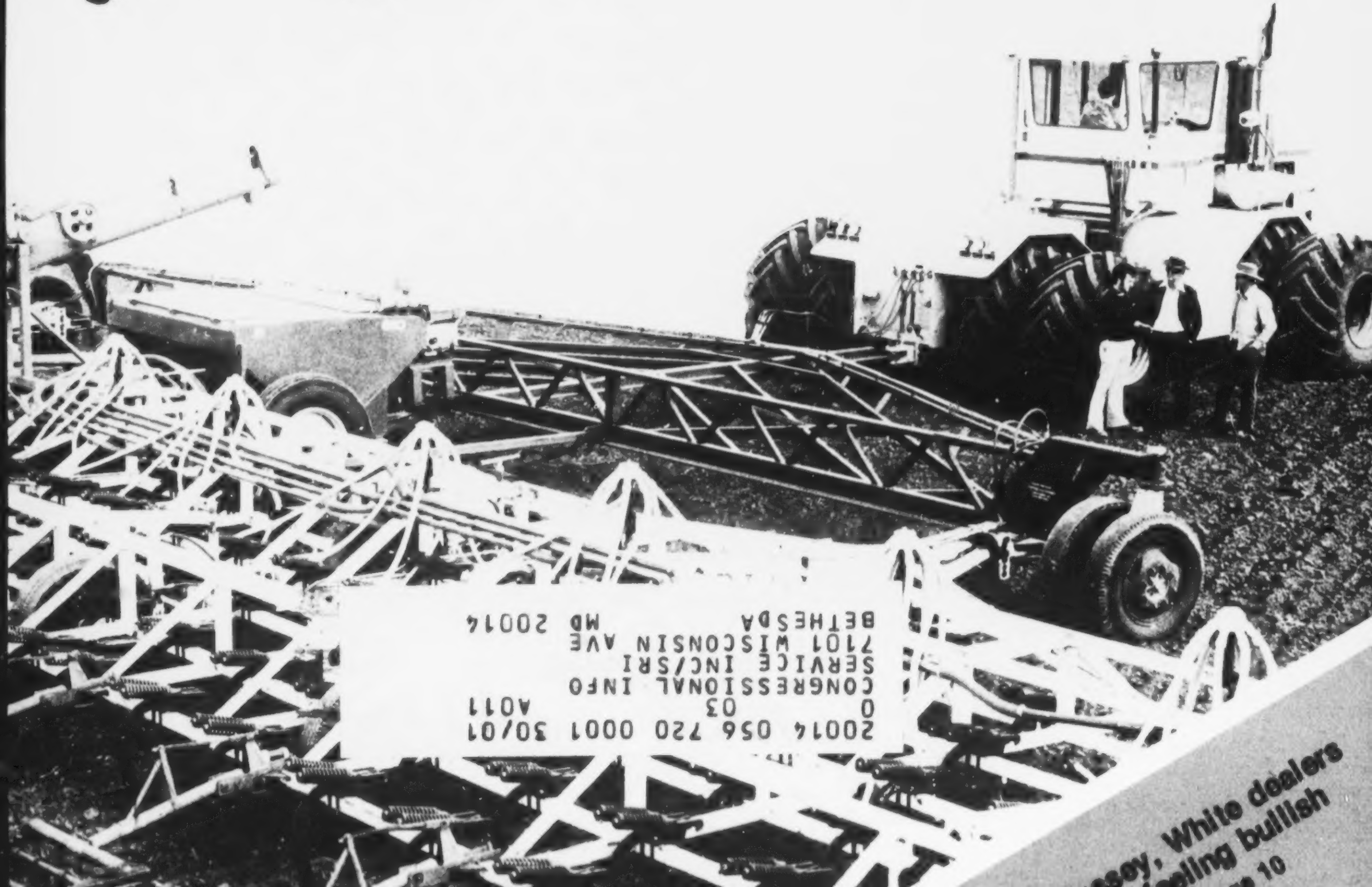
page 16



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ssey, White dealers
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November 21, 1980 • Vol. 95 • No. 23

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

6: **Good News!** Farm and Industrial Equipment Institute directors see a 5 to 15 per cent improvement in demand for farm equipment in 1981. John T. Phillips, Jr. (Lilliston Corp.) is elected chairman at the annual convention in Boca Raton, Fla.

10: **Massey, White Dealers Are Bullish.** A random survey of U.S. Massey-Ferguson and White Farm dealers by I&T shows most are confident about their futures with their suppliers.

16: **Air Seeders** are becoming one of the hottest development items in recent years. I&T traced down air seeder manufacturers and presents a roundup of those who now have units available or will have soon.

22: **How Dealers Performed in the 'Seventies.** NFPEDA averages and ratios are matched with dealer performances from annual Cost of Doing Business Studies. Formulas are presented to measure your business operation.

On the cover...
An Australian air seeding unit, the Napier, mounted on a 100-ft cultivator, advertises a seeding rate of an acre a minute. See page 16 for a review of air seeders and North American manufacturers.

DEPARTMENTS

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what's ahead...

I&T
SINCE 1886

November 21, 1980

SEPTEMBER TRACTOR SALES INCREASED over the previous month and were up 3.5 per cent from the same month a year ago, according to the Farm & Industrial Equipment Institute's flash report. Sales of 2-wheel-drive tractors (over 100 hp) were up 17.4 per cent; 4-wheel-drive tractor sales up 9.3 per cent. Combine and mower-conditioner sales improved over the previous month. The flash report:

Unit Retail Sales

	September			January-September		
Equipment	1980	1979	Pct. Change	1980	1979	Pct Chang
Farm Wheel Tractors						
2-wheel drive						
40-100 hp	5,077	5,521	- 8.0	45,468	51,515	-11.7
Over 100 hp	4,880	4,157	17.4	35,647	47,178	-24.4
Total 2-wheel drive	9,957	9,678	2.9	81,115	98,693	-17.8
4-wheel drive	1,042	953	9.3	7,275	8,118	-10.4
Total	10,999	10,631	3.5	88,390	106,811	-17.2
Combines (S-P)	4,114	5,576	-26.2	15,719	19,939	-21.2
Balers*	1,184	1,819	-34.9	11,944	16,404	-27.2
Forage Harvesters**	1,679	2,237	-24.9	6,422	7,738	-17.0
Mower Conditioners	1,678	2,290	-26.7	16,354	22,417	-27.0

*Bales under 200 lbs. **Shear-bar type

HIGHER CROP PRICES MEANS GOOD NEWS TO FARM MACHINERY MAKERS, according to some economists, the Wall Street Journal reports. Vincent J. Malanga, senior economist at A. Gary Shilling & Co., said, "The aggregate economy may slip back into recession in the near future, or, at best, post a negligible rise in 1981. But, the farm economy and the farm equipment industry seem poised for a substantial rebound." Sam Nakagama, economist at Kidder, Peabody & Co., said, "By sometime next year, the price of wheat is likely to hit $6 a bushel (versus $4 last spring), corn $4.50 (versus $2.60) and soybeans $13 (versus $6). While we continue to look for cattle to reach $90 to $100 per cwt, hogs are likely to hit $65 and broilers 65 to 70 cents per pound." He blames a poor grain harvest in Russia, which implies a tightening of world supplies, and administration policy in arranging massive grain exports to China.

USSR 1980 GRAIN OUTPUT, once seen as high as 220 million metric tons, has now been placed at 205 million tons by USDA's Foreign Agricultural Service. The report puts 1980-81 utilization at 236 million tons, 2 million tons above the indicated 234-million-ton availability, and puts import needs at 30 million tons. By contrast, U.S. grain production, which totaled 298 million tons last year, is seen at 265 million tons this year.

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Most MF, White dealers are optimistic

Other companies make approaches to carry their lines some dealers report.

■AN I&T SURVEY of how Massey-Ferguson and White Farm dealers regard their suppliers in present circumstances shows the vast majority who responded are confident about the future of their relationship.

The survey also indicated that

(More...)

White, MF Dealers Express Confidence

	Number of Dealer Responses		
I&T Asked: Which best describes your outlook today about the future of M-F or White as a viable supplier of equipment for you?	**Massey-Ferguson**	**White**	**Carrying Both Lines**
Very confident, optimistic	37	13	3
Reasonably confident	34	20	5
Somewhat confident	18	8	1
Somewhat pessimistic	5	5	0
Not confident	1	7	5
Very pessimistic	1	5	0
No response	2	0	0
Word about the financial problems of M-F and White began circulating strongly in late August and early September. Compared with that period, how do you feel about the situation today?			
Much better	38	11	3
Better	34	10	3
About the same	20	25	3
Less positive	3	7	1
Much worse	2	5	0
No response	1	1	2

Dealers Optimistic

(continued)

about one in five of the respondents had been contacted in the previous two months by another manufacturer of tractors and/or combines to discuss the possibility of a dealer contract.

The survey was conducted in response to questions from many persons in the industry asking how MF and White dealers felt about their companies and their continuing viability as equipment suppliers in view of the financial difficulties both firms were facing.

Survey development

Dealers polled by I&T were selected on a random basis from U.S. lists of Massey-Ferguson and White Farm dealers. Where recognized, MF company-owned stores were eliminated. The mailing went to 246 MF dealers and 127 White Farm dealers as well as to 15 others shown to represent both lines. All were located in the U.S.

The survey went out Oct. 9, and by Oct. 21, response was approximately 40 per cent.

Findings

As the table indicates, dealer outlook was strongly on the optimistic side, slightly more so for Massey-Ferguson than for White, but in both cases the undercurrent of pessimism was small.

Word about the companies' problems had been widely circulated in late August and early September with articles in the *Wall Street Journal* and other business periodicals. In the month and a half between then and I&T's survey, the vast majority of dealers either held to an originally optimistic feeling or had developed a brighter outlook than before.

Other companies

As is well understood in this business, manufacturers of equipment who are seeking to enlarge or improve their dealer organizations always do some level of recruiting from among the ranks of retailers currently representing rival companies.

The frequency or intensity of such recruiting efforts on a continuing basis has never been publicly documented, as far as I&T knows. But we thought it would be interesting to learn how strongly White Farm and Massey-Ferguson dealers were being wooed by competitive makers of tractors and combines over the past two months or so. Here's what our respondents told us:

Massey-Ferguson dealers: Of 96 respondents, 15 said they had been approached; 79 said they hadn't; two didn't answer. The approaches were made by the following companies: Allis-Chalmers, 2; Case, 1; Deere, 1; Deutz, 1; Ford, 4; Hesston, 2; New Holland, 2; White, 1; no company indicated, 3. (A few were approached by more than one company.)

We asked, "If you were approached, were you interested (on any basis)?" More than the 15 approached dealers answered this one: Five said yes and 27 said no.

Then we asked, "If you haven't been approached, are you considering making contact?" Eleven said yes, 69 said no; one was undecided.

White Farm dealers: Of 58 respondents, 18 said they had been approached; 40 said no. Companies doing the approaching: Allis-Chalmers, 4; Ford, 1; Hesston, 1; International Harvester, 10; Long, 1; Massey, 1; New Idea, 1; Same, 3; not indicated, 1.

Four said they were interested, while 23 said they were not. Apparently, some dealers answered this on a basis of, "If I were approached...."

Asked if they were seriously considering making contact with other companies about representation, three White dealers said yes, 44 said no and three said they were undecided.

Dual franchises: Four of the 12 respondents representing both MF and White had been approached, they reported. The companies were: Allis-Chalmers, 1; Deutz, 1; International Harvester, 3; New Idea, 1; Same, 1. All four said they were uninterested. One other dealer said he was considering making a contact.

Manufacturer comment

A few days after I&T's survey went into the mail, both Massey-Ferguson and White Farm managements were aware of it. They called and asked us if we would provide them with the general gist of the responses, and when they were counted, we did.

Said Glenn Christians, senior vice-president, MF: "Those results are in line with the overwhelming support the company has received from its dealers during the recent difficulties, and the many messages of confidence and optimism for the future that they have sent us. The major strength of any machinery manufacturer is its dealer organization. We want MF dealers to know how greatly we have valued their continuing loyalty and support in recent weeks."

Said Donald Granberg, marketing vice-president, White Farm: "I'm very much gratified by the responses of White dealers to your survey. It's a tribute to their loyalty to the company. I'm very optimistic about the future of White Farm Equipment."

Dealer comments

As with most I&T dealer surveys, we left space in which respondents could add whatever remarks they wished. Here are some of them:

"We have no intention of dropping White Farm Equipment. We have been with them since 1946."

"White is not bankrupt."

"I feel that with the good products White now has to offer and new ones ready to be introduced, someone will buy White out, or we'll make it on our own."

"We would consider other suppliers only if Massey went under, and we'd be surprised if they did. Part of the problem is irresponsible reporting of the press."

Two dealers, one MF, the other White, said they had planned on selling their dealerships this year or next year, but that the problems of the two companies had caused them to postpone their plans.

A White dealer reported that "competitive dealers have helped spread the bad news, mainly John Deere. We have had some customer opposition but really don't know how serious it may be." ☐

RETAIL SALES OF WHEEL TRACTORS*

(In Units)

	Total Wheel Tractors†				Cumulative for Jan.-Aug., 1979				Cumulative for Jan.-Aug., 1980			
	Aug. 1979		Aug. 1980		Farm Type				Farm Type			
	Farm	Non-Farm	Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm
Alabama	122	39	119	36	1,945	31	1,976	442	1,600	51	1,651	272
Alaska	2	1	4	8	11	.....	11	26	15	6	21	27
Arizona	40	52	57	34	451	59	510	455	520	63	583	317
Arkansas	197	52	149	36	2,592	167	2,759	481	2,170	223	2,393	344
California	328	299	296	192	3,090	228	3,318	2,566	2,820	247	3,067	1,799
Colorado	90	42	94	34	706	129	835	463	741	133	874	425
Connecticut	12	18	12	17	136	.....	136	185	178	4	182	134
Delaware	9	3	3	6	165	12	177	39	103	5	108	31
Florida	167	119	192	80	1,441	49	1,490	1,205	1,649	55	1,704	771
Georgia	154	83	99	45	2,719	27	2,746	650	2,131	36	2,167	366
Hawaii	3	7	7	12	39	4	43	68	47	2	49	70
Idaho	65	17	93	8	689	106	795	139	697	89	786	95
Illinois	367	106	357	73	4,659	505	5,164	1,165	3,191	483	3,674	552
Indiana	182	50	202	36	2,892	303	3,195	648	1,947	301	2,248	325
Iowa	398	26	437	16	6,227	382	6,609	319	3,654	360	4,014	188
Kansas	530	31	400	18	2,893	458	3,351	267	2,355	502	2,857	235
Kentucky	193	60	193	45	3,238	61	3,299	583	2,754	47	2,801	337
Louisiana	124	60	179	49	1,714	109	1,823	624	1,834	174	2,008	41[illegible]
Maine	20	9	19	7	155	1	156	103	170	3	173	63
Maryland	44	29	47	33	579	25	604	354	475	24	499	221
Massachusetts	9	38	7	25	105	.....	105	246	105	1	106	180
Michigan	134	67	186	53	1,933	164	2,097	955	1,561	155	1,716	539
Minnesota	390	54	395	23	4,245	635	4,880	527	2,516	365	2,881	259
Mississippi	179	37	217	39	2,445	87	2,532	466	2,255	179	2,434	274
Missouri	316	64	211	36	3,763	177	3,940	672	2,512	148	2,660	391
Montana	99	11	83	12	653	335	988	132	779	178	957	150
Nebraska	270	16	186	12	3,193	221	3,414	195	2,117	241	2,358	119
Nevada	10	15	8	13	96	4	100	136	84	8	92	91
New Hampshire	9	8	11	2	91	1	92	81	93	.....	93	56
New Jersey	20	62	22	42	229	5	234	500	206	2	208	335
New Mexico	40	39	23	10	340	20	360	221	288	16	304	147
New York	165	61	198	62	1,788	72	1,860	789	1,687	70	1,757	604
North Carolina	108	45	124	34	2,819	49	2,868	677	2,177	32	2,209	423
North Dakota	215	16	214	5	1,755	858	2,613	166	961	469	1,430	87
Ohio	236	142	251	70	3,132	233	3,365	1,236	2,431	227	2,658	586
Oklahoma	421	72	278	44	2,438	319	2,757	523	1,870	279	2,149	423
Oregon	124	37	123	40	860	55	915	391	924	52	976	264
Pennsylvania	140	115	139	101	1,665	28	1,693	1,018	1,481	38	1,519	732
Rhode Island	1	3	1	2	16	.....	16	30	12	.....	12	29
South Carolina	62	47	70	35	1,331	28	1,359	348	1,033	34	1,067	248
South Dakota	165	9	142	4	1,689	231	1,920	141	995	154	1,149	56
Tennessee	170	71	161	34	2,926	52	2,978	677	2,120	62	2,182	292
Texas	902	369	720	292	6,827	364	7,191	2,911	6,386	414	6,800	2,423
Utah	50	29	50	23	459	11	470	312	433	17	450	220
Vermont	21	5	30	5	247	6	253	54	230	1	231	26
Virginia	134	39	116	38	1,745	7	1,752	507	1,486	20	1,506	381
Washington	140	69	130	34	1,126	135	1,261	625	1,214	109	1,323	294
West Virginia	45	40	27	14	421	.....	421	185	343	.....	343	140
Wisconsin	320	44	360	37	4,120	152	4,272	537	3,157	128	3,285	329
Wyoming	33	19	25	9	304	25	329	176	227	26	253	109
U.S. Government	46	42	57	23	105	.....	105	502	195	.....	195	560
Miscellaneous‡	.....	129	1	5	43	3	46	1,047	229	.....	229	429
TOTAL	**8,021**	**2,917**	**7,525**	**1,964**	**89,250**	**6,933**	**96,183**	**27,766**	**71,158**	**6,233**	**77,391**	**18,183**

Data released October 23, 1980, Farm & Industrial Equipment Institute.

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*Figures do not include garden tractors, motor tillers or contractors off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland, Satoh); Allis-Chalmers; Belarus; J I Case; Deere; Deutz; Ford; International Harvester; Long; Massey-Ferguson; R. M. Wade (Satoh); Steiger; Versatile; and White.

†The monthly sales are those reported for that month only. The cumulative totals are subject to revisions reflecting updating in the basic sales data.

‡Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

DEALERSHIP GUIDELINES vs. DEALERSHIP PERFORMANCE:

How did we do in the 'seventies?

Second of two articles matches NFPEDA averages and ratios with ten years of actual performance, as seen in the averages of North American dealers participating in the association's annual Cost of Doing Business studies. Some areas of performance are encouraging (receivables turnover) while others (return on assets) are not. First article, "How Dealers' Profits Are Picked Clean by Inflation," appeared in I&T Oct. 21.

By Donald V. Koenig
(The author is former executive vice-president of NFPEDA and is now a marketing consultant and business broker.)

Reviewing Dealers' Performance in the 'Seventies

(Averages for all North American dealers participating in CDB surveys)

	1970	1971
Current Ratio (to 1)	1.51	1.49
Ownership Equity (pct.)	34%	32%
Receivables Turnover (times)	13.99	15.65
Net Working Capital Turnover (times)	5.91	6.9
Inventory to Net Working Capital (to 1)	2.3	2.4
Turnover of Total Assets (times)	1.75	2.0
Return on Assets (pct.)	5.37%	5.9%
Return on Net Worth (pct.)	15.92%	18.1%
Inventory Turnover (times)	2.07	2.39
Sales per Employee (actual dollars)	$58,580	$65,734
Sales per Employee (adjusted dollars)*	$50,674	$54,102

■INDUSTRY ratios and guidelines provide a benchmark upon which to measure one's business operations and can provide assistance in developing more effective management practices for greater profitability.

The NFPEDA's annual Cost of Doing Business Studies presents 10 financial and operating ratios and averages for all dealers represented in the report. The accompanying table shows the all-dealer averages for the last decade.

Formulas and guidelines for measuring your financial and operations ratios follow. The guidelines reflect a middleground between ideal targets, which can be achieved by outstanding businessmen, and industry-wide averages.

Current ratio

Formula:

Current Assets ÷ Current Liabilities

This ratio is one of the more commonly used tools of financial analysts, including bank loan officers. The CDBS defines this ratio as "...the ability to handle current debts. A ratio of 2.00 to 1 ($2 of current assets for each $1 of current liabilities) is considered satisfactory. When the ratio falls below 2.00 to 1, creditors have a greater interest in current assets than the owner."

Interestingly, in no year since NFPEDA began calculating the Current Ratio in 1965 has any of the all-dealer averages ever reached 2.00 to 1. The highest ratio recorded in the 'seventies was 1.65 to 1 in 1973. It, too, falls short of the 1.75 to 1 ratio that several of the manufacturer sponsored dealer-development programs recommend.

Except for upswings in 1973, 1974 and 1977 the current ratio has been trending steadily downward, closing at 1.42 to 1 in 1979. Despite higher profits and sales, dealers have had to rely more heavily on outside financing to carry on their business.

Ownership equity

Formula:

Net Worth ÷ Total Assets

A generally accepted minimum guideline for this ratio is 30 per cent to 35 per cent. The important

(More...)

1972	1973	1974	1975	1976	1977	1978	1979
1.47	1.65	1.63	1.49	1.46	1.51	1.45	1.42
32%	39.47%	39.58%	34.95%	32.08%	35.89%	30.58%	29.29%
13.1	17.83	18.58	18.25	18.08	17.28	17.31	18.98
7.21	8.26	8.16	8.22	8.17	6.45	7.78	8.24
2.29	1.72	.91	2.37	2.53	2.44	2.60	2.78
2.02	2.77	2.67	2.3	2.23	1.86	2.09	2.12
6.38%	15.9%	15.94%	12.16%	9.47%	6.66%	7.93%	7.78%
19.79%	40.28%	40.26%	34.8%	29.53%	18.56%	25.93%	26.57%
2.68	3.88	3.40	2.78	2.60	2.13	2.43	2.42
$76,275	$90,835	$103,454	$112,380	$122,848	$126,046	$138,952	$166,868
$60,249	$67,838	$70,473	$69,845	$72,605	$70,299	$72,220	$79,685

*See first article in this series, I&T Oct. 21, for an explanation of how dollars are adjusted for inflation.

Source: Cost of Doing Business studies, 1970-1979, National Farm & Power Equipment Dealers Assn.

thing here, as with most ratios and measurement tools, is the direction of movement from year-to-year. The CDBS averages show 1979 as the only year that fell below the 30 per cent minimum.

Receivables turnover

Formula:
Total Sales ÷ Receivables

Generally, a higher turnover rate indicates dealers are doing a better job controlling their accounts receivable. The comparison of current to previous figures is the best use of this ratio and helps to spot unfavorable trends. The CDBS "Average Dealers" have been trending upward and closed the decade with their highest receivables turnover ratio of 18.98 times.

Net working capital turnover

Formula:
Total Sales ÷ Net Working Capital

Net working capital is determined by subtracting current liabilities from current assets. The turnover rate is a good indicator of whether working capital is adequate for the volume of business being conducted.

Net working capital turnover rates will vary considerably by type, size and location of dealerships. The direction and scope of the trend movement may be the most informative aspect of this ratio.

As a general rule, high-profit dealers will show a net working capital turnover rate about two turns lower than average dealers. Conversely, low-profit dealers will show a similarly higher turnover rate.

Inventory to new working capital

Formula:
Inventory ÷ Net Working Capital

In 1979 dealers ended the decade with $2.78 worth of inventory for each $1 of working capital. Note how this figure has steadily risen from 91 cents in the highest profit year of 1974. This represents a buildup of inventory and is characteristic of the heavy financing common to this industry.

In Part I of this series we pointed out that dealers' net worth had grown at a rate of less than one-half that of either sales or profits. This relatively low rate of increase in net worth may be the principal factor contributing to the rising ratios for inventory to net working capital.

Turnover of total assets

Formula:
Sales ÷ Total Assets

Because of wide variations in individual dealership operations and capital structures, it is difficult to establish specific guidelines for this ratio. Tracking the direction and magnitude of movement is the most meaningful use of this ratio.

Return on assets

Formula:
Net Profit ÷ Total Assets

The return on assets tells how good a manager you are in terms of handling the total assets under your control. Most industry sources recommend 15 per cent as a viable guideline. CDBS high-profit dealers consistently achieve or exceed this rate of return.

During the decade of the 'seventies the average dealer figures reached this guideline only in 1973 and 1974. Since then it has trended downward to close the period at 7.78 per cent.

Return on net worth

Formula:
Net Profit ÷ Net Worth

This is a measurement of whether being in business is worth the risk and aggravation. As the NFPEDA study says, "Adequacy of profit must be measured in the light of current returns on money in the investment market, as well as compensation for risk."

High-profit dealers consistently show a return on net worth of 40 per cent or higher. Average dealers hit that figure only in 1973 and 1974. Overall, they ended the decade at 26.5 per cent, about 10 percentage points higher than they showed in 1970. One reason for this is the sluggish growth of net worth during the 'seventies. Had net worth increased at the same rate as profits the ratio might well be lower than 26.5 per cent.

Inventory turnover

Formula:
Cost of Sales ÷ Number of Employees

The usual minimum guideline for this ratio is 2.5 to 1. However, product mix, geographic area and other factors will affect each individual dealership's ratio. As with all ratios and percentages, the direction and magnitude of movement may be the most significant factor to consider.

Sales per employee

Formula:
Total Sales ÷ Number of Employees

The direction and magnitude of movement is of primary consideration when reviewing this figure. It forms a partial basis for determining the degree of productivity of your work force.

Dealers with a high percentage of service shop sales in relation to wholegoods will usually show a lower than average volume of sales per employee. For this reason, it is suggested that dealers calculate sales per employee by departments. These departmental figures have been reported in the CDBS since 1973.

A review of the averages indicates that on an adjusted dollar basis, sales per employee increased 57 per cent between 1970 and 1979. Total sales, however, increased during that same period by 119 per cent. Perhaps there should be more similarity between these two figures. A possible explanation might be that dealers have had to increase their office and service personnel disproportionately to the rest of their work force.

The decade of the 'seventies was a good one for dealers—at least those who were represented in the NFPEDA Cost of Doing Business Studies. The years 1973-75 will long be remembered as among the best the industry has known.

Despite increased sales and profits, dealers have not been able to achieve the rate of capital formation needed to sustain their higher volume of business. This may well be the biggest challenge facing dealers in the 'eighties. □

RETAIL SALES OF SELECTED FARM EQUIPMENT— Jan. - Aug. 1979 and 1980 (1)
(In Units)

	Combines Self-Propelled		Corn Heads		Hay Balers (2)		Windrowers Self-Propelled Power Units		Windrowers Self-Propelled Total Heads		Grinder-Mixers		Shear-Bar Forage Harvesters (3)	
	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980
Alabama	165	98	60	34	178	100	1	2	1	1	154	92	37	19
Alaska	.....	3	.....	.....	4	12	.....	2	.....	2	.....	1	.....	.....
Arizona	19	35	.....	.....	27	34	46	51	49	63	4	6	11	10
Arkansas	295	239	7	1	344	152	2	.....	1	.....	43	48	14	7
California	118	160	26	15	151	137	194	216	218	240	11	4	38	39
Colorado	219	209	48	56	361	303	216	162	221	170	51	47	50	40
Connecticut	1	.....	.....	.....	57	51	.....	.....	.....	.....	2	.....	15	14
Delaware	16	18	12	12	14	8	.....	1	.....	1	9	8	5	6
Florida	55	47	44	34	61	50	2	.....	2	.....	49	31	14	17
Georgia	328	222	274	198	183	130	1	1	1	1	387	168	91	70
Hawaii	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Idaho	204	219	3	10	369	502	275	307	277	308	26	38	26	41
Illinois	1,526	962	1,218	922	325	278	15	17	15	17	493	350	181	136
Indiana	791	577	667	624	337	245	8	7	8	7	453	250	119	97
Iowa	1,398	1,054	1,134	1,095	368	250	228	108	220	114	1,609	852	467	321
Kansas	1,207	1,189	113	138	407	235	340	225	348	231	262	171	141	142
Kentucky	212	124	110	83	383	232	3	3	4	3	243	232	88	80
Louisiana	270	164	1	3	114	36	.....	.....	.....	.....	12	12	9	14
Maine	1	4	.....	.....	71	52	3	2	3	2	1	.....	24	18
Maryland	54	68	35	70	107	93	7	9	6	9	38	29	44	30
Massachusetts	.....	.....	.....	.....	41	41	1	6	.....	6	1	1	10	14
Michigan	253	191	157	157	349	269	59	50	61	51	196	163	246	209
Minnesota	954	710	606	505	746	560	593	474	607	487	725	406	592	404
Mississippi	262	186	3	2	146	53	.....	1	.....	1	39	26	46	45
Missouri	562	423	229	209	556	347	70	54	70	56	496	371	117	109
Montana	235	272	4	2	329	292	397	319	418	350	56	48	23	20
Nebraska	676	683	376	480	201	159	429	227	440	240	487	358	191	162
Nevada	1	2	.....	.....	39	34	62	32	65	38	1	2	2	7
New Hampshire	.....	.....	.....	.....	41	48	.....	.....	.....	.....	2	.....	15	9
New Jersey	17	14	8	9	51	24	.....	.....	.....	.....	11	6	7	9
New Mexico	16	23	5	8	115	96	77	48	77	51	18	10	4	.....
New York	77	74	75	83	621	610	55	52	55	53	89	83	338	384
North Carolina	244	149	171	141	265	219	3	2	3	2	175	116	49	44
North Dakota	826	563	14	18	74	39	745	395	796	424	145	96	58	52
Ohio	700	501	504	395	559	391	10	8	10	8	404	276	150	143
Oklahoma	384	365	5	7	773	335	144	85	147	91	117	87	35	23
Oregon	145	139	.....	4	248	347	174	194	175	205	26	19	47	26
Pennsylvania	134	82	86	98	765	582	67	42	66	44	244	214	308	271
Rhode Island	.....	.....	.....	.....	3	6	.....	7	.....	6	1	.....	.....	1
South Carolina	163	96	83	66	82	54	.....	.....	.....	.....	92	44	24	25
South Dakota	360	292	126	113	144	71	669	431	713	462	298	225	169	168
Tennessee	216	138	56	63	513	326	.....	1	.....	1	196	143	99	72
Texas	644	663	173	170	1,150	487	97	72	105	77	186	155	51	61
Utah	33	27	1	7	248	277	113	92	114	97	57	22	35	44
Vermont	.....	.....	.....	.....	99	100	.....	3	.....	3	2	.....	67	81
Virginia	92	60	81	53	417	319	6	7	6	7	125	67	91	77
Washington	284	279	28	13	238	363	157	143	165	146	17	15	62	81
West Virginia	2	.....	3	.....	224	125	.....	1	.....	1	20	21	14	3
Wisconsin	174	247	170	279	1,520	1,135	305	280	305	284	481	377	1,268	1,081
Wyoming	29	34	2	1	168	151	129	144	137	154	20	15	14	15
U.S. Government	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous (4)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	.....
TOTAL	14,363	11,605	6,718	6,179	14,586	10,760	5,703	4,283	5,909	4,514	8,580	5,725	5,506	4,743

Data released October 23, 1980, Farm & Industrial Equipment Institute.

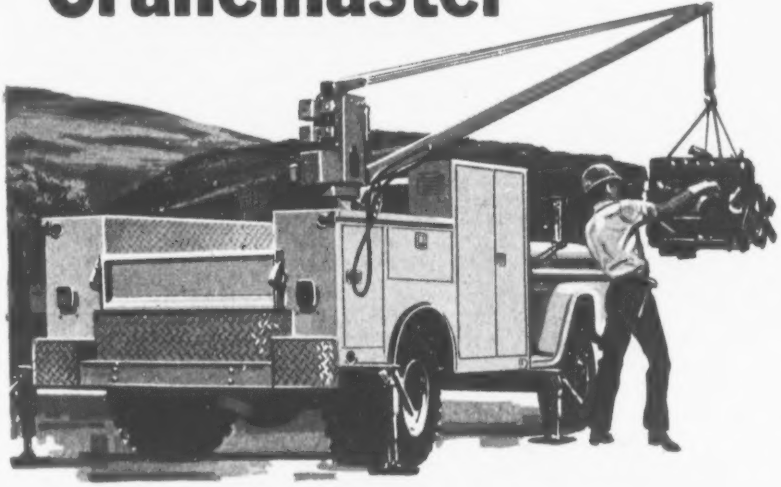
(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled.

(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

Mower Conditioners All Types		Manure Spreaders Conveyor-Type		
1979	1980	1979	1980	
187	110	11	15	Alabama
1	5	1	1	Alaska
4	8	6	6	Arizona
478	279	87	73	Arkansas
39	31	57	31	California
127	121	54	51	Colorado
70	77	63	52	Connecticut
14	15	54	45	Delaware
67	38	26	20	Florida
218	179	40	35	Georgia
1	.....	1	1	Hawaii
92	132	81	72	Idaho
593	455	770	428	Illinois
553	386	547	340	Indiana
1,185	810	1,950	946	Iowa
820	446	211	156	Kansas
1,023	662	266	215	Kentucky
91	34	22	18	Louisiana
99	77	95	72	Maine
133	87	169	167	Maryland
59	41	50	54	Massachusetts
585	489	610	520	Michigan
1,201	776	1,417	896	Minnesota
145	70	27	16	Mississippi
1,448	981	366	243	Missouri
100	124	41	37	Montana
504	357	440	277	Nebraska
10	7	2	5	Nevada
50	64	43	41	New Hampshire
62	41	48	36	Now Jersey
24	13	5	5	New Mexico
937	867	1,066	876	New York
318	189	126	109	North Carolina
161	90	87	71	North Dakota
870	610	813	592	Ohio
794	509	25	46	Oklahoma
150	229	88	73	Oregon
906	711	1,031	869	Pennsylvania
6	4	1	.....	Rhode Island
114	59	28	23	South Carolina
128	50	276	147	South Dakota
785	477	146	132	Tennessee
1,245	856	115	104	Texas
140	138	74	84	Utah
180	177	207	152	Vermont
626	573	180	167	Virginia
126	217	105	96	Washington
192	127	72	44	West Virginia
2,419	1,858	2,258	1,415	Wisconsin
47	30	44	29	Wyoming
.....	.....	.....	.....	U.S. Government
.....	.....	1	.....	Miscellaneous
20,127	14,676	14,303	9,903	TOTAL

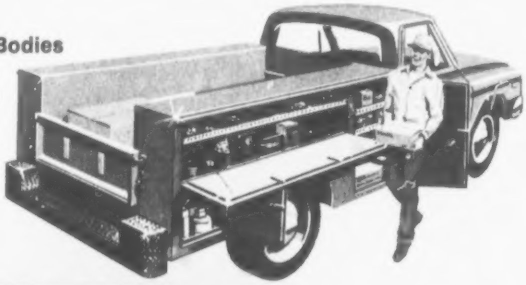
Job-planned for routine and emergency field maintenance!

Reading Cranemaster



Cranemaster is the job-planned rugged crane body made stronger to last longer. Mount a field service crane on this heavy duty steel body, load a full supply of replacement parts and tools in its job-planned compartments, and you're ready for every service call. Gas bottles are carried in a vented compartment. A steel sliding tray gives you easy access to your mechanic's tool box. Compartment tops and cargo area sides are armored with safety tread plate steel. The rugged steel body panels and U-girder understructure are fully electric welded into one integral unit to resist road-shock on any terrain.

Reading Service Bodies
are available in
steel or aluminum
for full size or
compact chassis.



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AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

BILL ENLOW TRACTOR SALES
Tulsa, Oklahoma
(October 11, 1980)

ALLIS-CHALMERS TRACTORS

WD LP, 1948 (Fair)	525
WD, 1950 (Fair)	600*
WD, 1952 (Fair)	500*
WD-45, 1956 (Fair)	600
D-14, 1959 (Good)	1300
D-17, 1963 (Good)	1700*
5020 diesel, 1980 (Excellent)	3200

CASE TRACTORS

DC-4, 1953 (Fair)	350*
VAC, 1954 (Good)	575*
430, 1962 (Good)	1250
600, 1957 (Fair)	600*
830 diesel, 1963 (Good)	1700
1070 diesel, 1973 (Good)	4950*

DAVID BROWN TRACTORS

990 diesel, 1966 (Fair)	1250
1200 diesel, 1969 (Good)	3150

FERGUSON TRACTORS

20, 1948 (Fair)	725
20, 1948 (Good)	900*
20, 1949 (Fair)	700
20, 1949 (Good)	1150
30, 1951 (Good)	990
30, 1951 (Good)	1025
30, 1953 (Good)	1275
30, 1954 (Fair)	900*

FORD TRACTORS

9N, 1943 (Fair)	700*
9N, 1943 (Good)	1000
9N, 1944 (Fair)	815
9N, 1945 (Fair)	875
9N, 1946 (Fair)	700
9N, 1946 (Fair)	775
9N, 1947 (Good)	1450
9N, 1947 (Good)	1035*
9N, 1947 (Good)	1300
8N, 1947 (Fair)	1050
8N, 1948 (Good)	1150
8N, 1948 (Good)	1150
8N, 1948 (Good)	1350
8N, 1949 (Good)	1100*
8N, 1949 (Good)	1200*
8N, 1950 (Good)	1100
8N, 1950 (Fair)	900*
8N, 1950 (Good)	1350
8N, 1951 (Good)	1350
8N, 1951 (Good)	1300
8N, 1952 (Good)	1400
8N, 1952 (Good)	1450
8N, 1952 (Good)	1600
8N, 1952 (Good)	1750
8N, 1952 (Good)	1935
NAA, 1953 (Rough)	1000
NAA, 1953 (Fair)	1550*
NAA, 1953 (Fair)	1600*
600, 1954 (Rough)	1275
600, 1955 (Fair)	1650
600, 1955 (Fair)	1550*
850, 1956 (Fair)	1475
860, 1956 (Good)	1850*
871 Select-O-Speed, 1957 (Rough)	1100*
Dexta diesel, 1962 (Good)	1675*
Mjr. diesel, 1961 (Rough)	825
2000, 1962 (Good)	2125
3000, 1967 (Good)	2650*
3000 diesel, 1969 (Good)	3200*
3000 diesel, 1969 (Fair)	2650
3000, 1970 (Good)	3075*
3600 diesel, 1977 (Good)	3900
4000, ldr., 1962 (Fair)	1700*
4000, 1965 (Good)	2800*
4000 diesel, 1966 (Good)	3250*
4400, 1971 (Good)	3000
5000 diesel, Select-O-Speed, 1968 (Fair)	2400*
5000 diesel, 1969 (Good)	4250
6000 diesel, Select-O-Speed, 1964 (Fair)	1100
7000 diesel, 1969 (Good)	6400

INTERNATIONAL HARVESTER TRACTORS

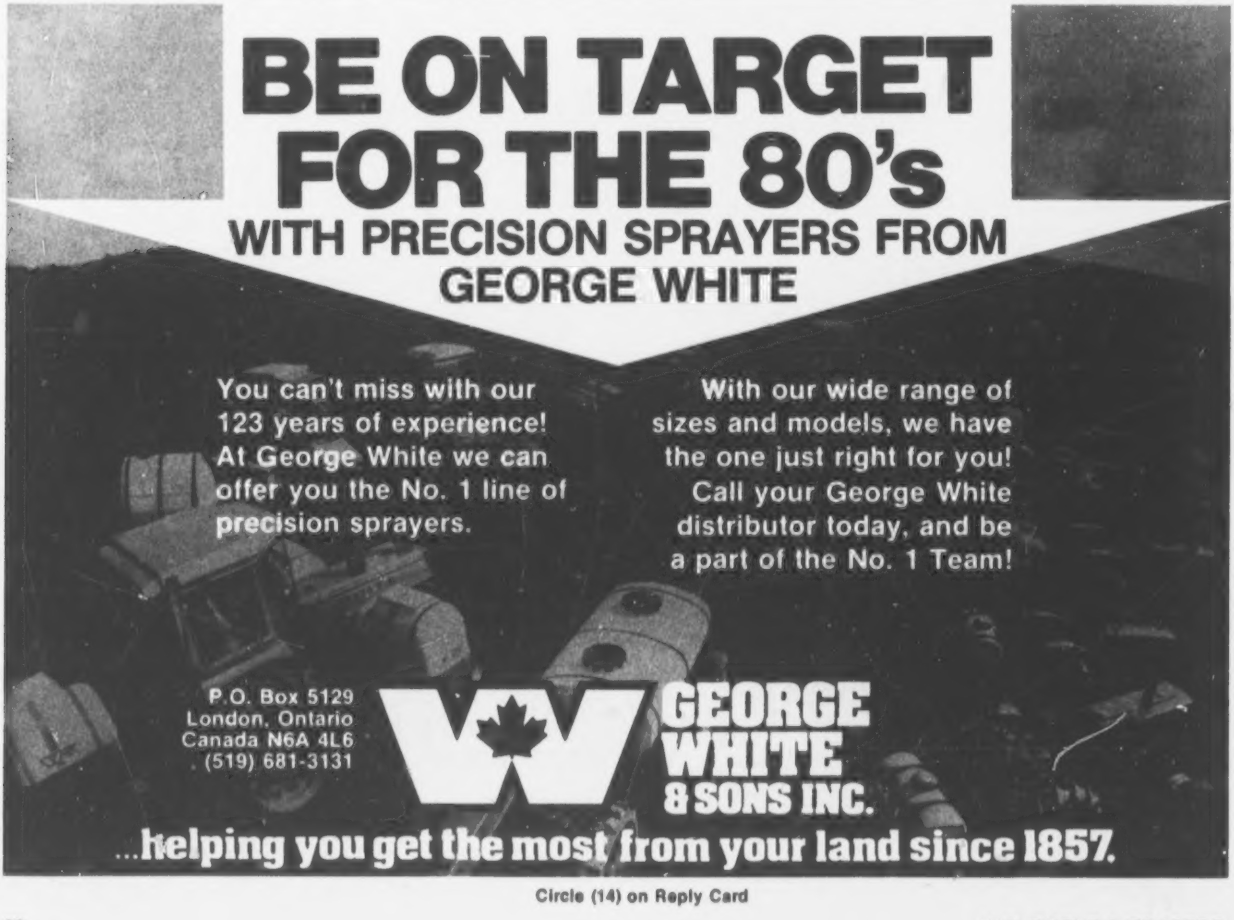
154 Loboy, 1969 (Good)	1930
A, cult., 1945 (Good)	800*
340, 1960 (Fair)	1375
340, 1963 (Good)	1800*
2444, 1968 (Good)	2375
3414, ldr., 1966 (Good)	3500
454 diesel, 1972 (Good)	4275
806 diesel, 1966 (Good)	4900

JOHN DEERE TRACTORS

730 diesel, 1959 (Good)	2200
2010, 1962 (Fair)	1475*
2010 diesel, 1964 (Good)	1750*
2010 diesel, 1964 (Good)	2000
300, backhoe, 1973 (Good)	4900

MASSEY-FERGUSON TRACTORS

35, 1959 (Fair)	1550
35 diesel, 1959 (Fair)	1425
35, 1961 (Good)	1800
50, 1960 (Fair)	1650
65 diesel, 1958 (Rough)	1000
65 diesel, 1958 (Fair)	1650*
65, 1960 (Good)	1900*
65 diesel, 1961 (Good)	2100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65 diesel, 1962 (Good)	2400
65, 1962 (Good)	2300
65, 1964 (Good)	2300
65 diesel, 1964 (Good)	2475
65, ldr., 1964 (Good)	2675
65 diesel, 1964 (Good)	3000
85 diesel, 1962 (Good)	1950
S-90 diesel, 1963 (Fair)	1690*
135, 1964 (Fair)	2100
135, 1964 (Fair)	2200
135, 1966 (Good)	2500
135 diesel, 1967 (Good)	3250
135 diesel, 1968 (Good)	3200
200, ldr., 1967 (Fair)	2700
230 diesel, 1980 (New)	6850*
230 diesel, 1980 (New)	6900*
230 diesel, 1980 (New)	6650
230 diesel, 1980 (New)	7250
235 diesel, 1976 (Good)	3850
165 diesel, 1965 (Good)	3100*
165 diesel, 1966 (Good)	3000
165 diesel, 1968 (Good)	3650
165 diesel, 1969 (Good)	3700*
165 diesel, 1969 (Good)	3500*
165 diesel, 1970 (Good)	3900
165 diesel, 1971 (Good)	3700
175 diesel, 1965 (Fair)	2500*
175 diesel, 1965 (Rough)	1950
175 diesel, 1966 (Fair)	2750
175 diesel, 1967 (Good)	3350
175 diesel, 1974 (Good)	4250*
180 diesel, 1967 (Good)	3050*
180 diesel, 1968 (Good)	3310*
180 diesel, 1969 (Good)	3200*
180 diesel, 1969 (Good)	3400
275 diesel, 1977 (Good)	6600
275 diesel, 1980 (New)	12,500*
275 diesel, 1977 (Good)	6200
285 diesel, 1980 (New)	13,500*
1100 diesel, 1972 (Good)	5500*
1130 diesel, 1972 (Good)	5400
1150 diesel, 1969 (Good)	5200*

LEYLAND TRACTORS

344 diesel, 1966 (Good)	1900*
460 diesel, 1970 (Good)	2250

MINNEAPOLIS-MOLINE TRACTORS

BF, 1948 (Good)	725
5-Star, 1959 (Fair)	1530
G-900 diesel, 1968 (Good)	4000
G 1000 LP, 1967 (Good)	3250*

NUFIELD TRACTOR

3/45 diesel, 1968 (Good)	1800*

OLIVER TRACTOR

1850 diesel, 1967 (Good)	3700*

JONES FARM EQUIPMENT CO.
Dothan, Alabama
(October 14, 1980)

ALLIS-CHALMERS TRACTORS

7040 diesel, 1977 (Good)	14,500*
185 diesel, 1974 (Excellent)	8950

CASE TRACTORS

830 diesel, 1963 (Fair)	950
430 diesel, 1964 (Good)	1600

DAVID BROWN TRACTORS

1210 diesel, 1974 (Good)	3200*
1200 diesel, 1968 (Fair)	1400
990 diesel, 1973 (Good)	4000*
885 diesel, 1975 (Excellent)	3200*
885 diesel, 1973 (Good)	2700*
880 diesel, 1966 (Fair)	1000

MASSEY-FERGUSON TRACTORS

1130 diesel, 1968 (Fair)	3100
1130 diesel, 1968 (Fair)	3100*
1105 diesel, 1977 (Excellent)	9300*
1085 diesel, 1974 (Good)	7400
1085 diesel, 1973 (Fair)	5100
1085 diesel, 1973 (Fair)	4100*
1080 diesel, 1971 (Fair)	3800*
275 diesel, 1975 (Good)	6100*
180 diesel, 1968 (Good)	2750*
180 diesel, 1966 (Excellent)	3750
175 diesel, 1972 (Excellent)	4100
175 diesel, 1969 (Excellent)	4000*
175 diesel, 1969 (Good)	3600*
175 diesel, 1968 (Good)	3500*
175 diesel, 1967 (Good)	3500*
165 diesel, 1968 (Good)	3100
165 diesel, 1967 (Good)	3350*
165 diesel, 1967 (Good)	3000
165, 1967 (Rough)	2050*
165 diesel, 1966 (Good)	3350*
165 diesel, 1966 (Good)	3300*
165 diesel, 1966 (Good)	3200
150, 1971 (Fair)	2550
150 diesel, 1965 (Good)	2800*
135 diesel, 1971 (Fair)	1950*
135, 1966 (Good)	3400*
50, 1960 (Good)	1575
50, 1958 (Fair)	1300
35 diesel, 1963 (Good)	2350
35, 1956 (Fair)	725
35, 1956 (Good)	1100*
TO30, 1953 (Good)	1150
TO20, 1950 (Rough)	625
TO20, 1949 (Good)	1000
TO20, 1949 (Fair)	750*

FORD-FERGUSON TRACTORS

9N, 1941 (Rough)	475
9N, 1941 (Good)	900*
9N, ldr, 1940 (Fair)	650

FORD TRACTORS

8000 diesel, cab, 1971 (Good)	4900
6700 diesel, 1976 (Excellent)	10,100
5000 diesel, 1970 (Excellent)	6350
5000 diesel, 1967 (Fair)	3250*
5000 diesel, 1966 (Fair)	3100*
4000 diesel, 1971 (Excellent)	4000
4000 diesel, 1968 (Good)	3000*
4000 diesel, 1968 (Excellent)	4000*
4000 diesel, Select-O-Speed, 1965 (Rough)	2350
4000 diesel, 1963 (Fair)	1650*
4000 diesel, 1963 (Good)	2000*
4000 diesel, 1963 (Good)	1975
4000 diesel, 1963 (Good)	2025
4000 diesel, 1963 (Good)	1950
3600 diesel, 1977 (Excellent)	6750*
3600 diesel, 1976 (Good)	5000
3400 diesel, ldr., 1970 (Good)	3600
3400 diesel, ldr., 1969 (Good)	3400
3400 diesel, ldr., 1968 (Fair)	3000
3000 diesel, 1974 (Excellent)	4250
3000 diesel, 1972 (Good)	3100*
3000 diesel, 1968 (Fair)	2250
3000 diesel, 1966 (Fair)	1950
3000 diesel, 1965 (Good)	2900
3000 diesel, 1965 (Good)	3200
2000 diesel, 1966 (Good)	3000*
2000, 1966 (Good)	3000
2000, Select-O-Speed, 1963 (Rough)	750*
871 diesel, Select-O-Speed, 1958 (Good)	1200
841 diesel, 1960 (Good)	1750
641, 1959 (Excellent)	1950
640, 1956 (Good)	1500
640, 1956 (Excellent)	2200
640, 1956 (Excellent)	1830
Sup. Dexta, 1963 (Good)	1175
Sup. Dexta, 1963 (Good)	1250*

(More...)

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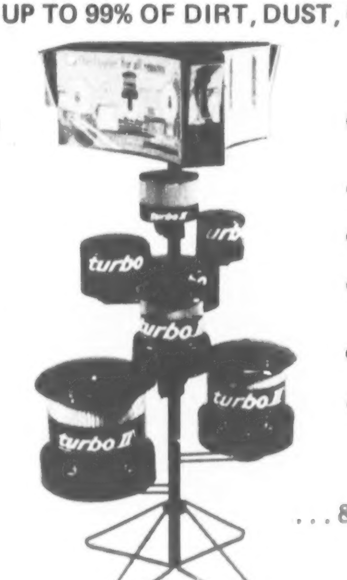

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Auctions
(continued)

Dexta, 1959 (Good)	975*
Dexta, 1959 (Good)	975
Dexta, 1959 (Excellent)	1450
Dexta, 1959 (Good)	975*
Jub. 1953 (Good)	1575
Jub. 1953 (Excellent)	1900
Jub. 1953 (Fair)	1050
Jub. 1953 (Fair)	1025
8N, 1952 (Excellent)	1525
8N, 1952 (Good)	1275
8N, 1952 (Good)	1375
8N, 1951 (Good)	1050
8N, 1949 (Excellent)	1700
8N, 1948 (Fair)	850
8N, 1948 (Fair)	800
8N, 1948 (Fair)	725

INTERNATIONAL HARVESTER TRACTORS

2400 diesel, ldr, backhoe, 1976 (Excellent)	5000
1566 diesel, cab, duals, 1975 (Excellent)	11,000*
806 diesel, 1964 (Fair)	3200*
706 diesel, 1965 (Fair)	2200
656 diesel, 1970 (Good)	3300*
656, 1970 (Good)	3500*
656 diesel, 1967 (Good)	3550
656 diesel, 1967 (Fair)	2400*
574 diesel, 1967 (Good)	3500*
544 diesel, 1971 (Fair)	2000*
544 diesel, 1968 (Good)	3200
504 diesel, 1968 (Excellent)	2600
464 diesel, 1974 (Good)	3000
460, 1959 (Fair)	900*
444 diesel, 1970 (Fair)	1175
240, cotton picker, 1961 (Fair)	800
240, cotton picker, 1961 (Fair)	950
240, 1960 (Rough)	625
Cub, mo., 1948 (Excellent)	1500

JOHN DEERE TRACTORS

4620 diesel, 1972 (Good)	7000*
4440 diesel, cab, duals, 1979 (Excellent)	23,900
4020 diesel, 1965 (Good)	6200*
3020 diesel, 1965 (Good)	5100*
3020 diesel, 1965 (Good)	5200
2520 diesel, 1970 (Excellent)	5400
2510 diesel, 1968 (Good)	3900*
2020 diesel, 1970 (Good)	3700*
2020 diesel, 1966 (Good)	4000*
2010 diesel, 1965 (Good)	1700*
2010 diesel, 1965 (Rough)	775
2010, 1964 (Rough)	850*
1020 diesel, 1967 (Good)	3050
1010, 1961 (Excellent)	2000
520, 1957 (Good)	1050
430, 1959 (Excellent)	1675
410 diesel, ldr, backhoe, 1972 (Excellent)	7000
300 diesel, ldr., 1970 (Good)	4800*
50, 1953 (Fair)	450

LONG TRACTORS

9500 diesel, 1974 (Good)	1600
560 diesel, (Good)	4100
445 diesel, 1976 (Fair)	1450
360 diesel, 1978 (Good)	3250

OLIVER TRACTORS

1365 diesel, 1973 (Good)	2850
1250 diesel, 1966 (Rough)	725

SATOH TRACTOR

S-370 diesel, Beaver, (Good)	2125*

NOTES

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.
Prices reported are NOT averages.

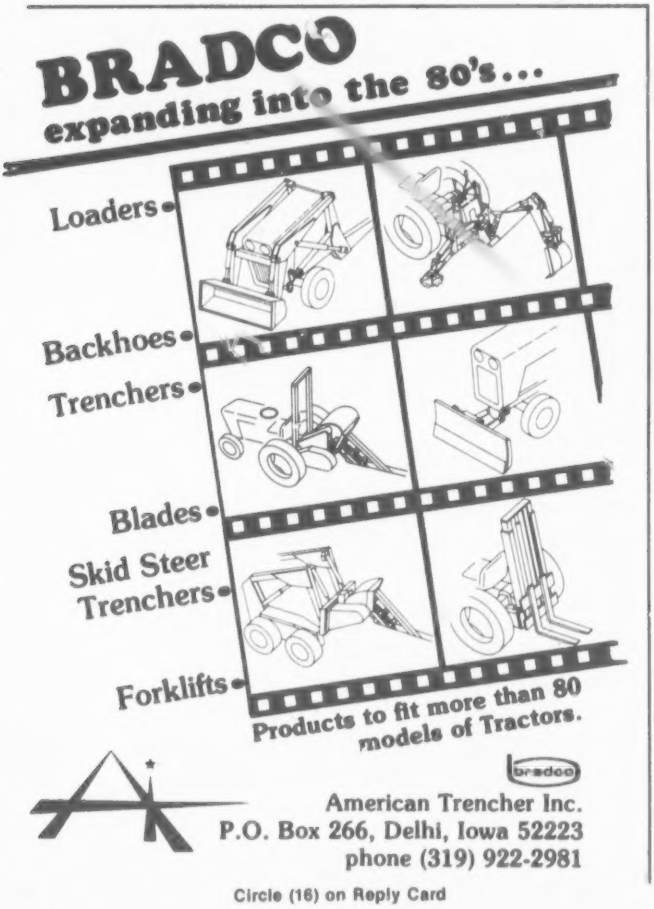
Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

DEMONSTRATOR means—used for demonstrating only and in practically new condition.



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Starting on page 10

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In the I&T Manufacturers Edition

Reviewing Load-Sensitive Hydraulics

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INTERTEC PUBLISHING CORP.

December 15, 1980 • Vol. 95 • No. 24

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

10: **Front-Wheel-Drive Assist.** FWA tests by Deutz engineers and others show many technical and economic advantages. Front-tire wear is a problem though, as Purdue engineers discover.

16: **A Touch of CLAAS.** German manufacturer will market combines through Ford dealers in North America and will acquire a facility for assembling and manufacturing in a Corn Belt state.

20: **Farm Equipment Wholesalers Assn.** Joe L. Canady takes command after tumultuous year in the industry, but members look to the future with optimism.

22: **Farm Equipment Manufacturers Assn.** A record number of manufacturers invade New Orleans for meeting to explore new management techniques. Robert M. Kools is elected president.

26: **Agricultural & Industrial Manufacturers Representatives Assn.** AIMRA members learn about personal financial management, adopt new contract form, and elect Al Price president.

48: **More on FWA.** Allis-Chalmers and J I Case introduce new tractors series offering front-wheel-drive assist options.

On the cover...Tractors with front-wheel-drive assist dominate the European market and are gaining a bigger share of the North American market through imports, such as the Deutz tractor on the cover. FWA units are provided as options on some American tractors, like this one on a Ford tractor.

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what's ahead...

December 15, 1980

OCTOBER SALES OF FARM TRACTORS and selected farm machinery were off across the board in the U.S., according to the Farm & Industrial Equipment Institute's flash report. Sales of 2-wheel-drive and 4-wheel-drive tractors were off more than 12 per cent, compared with October 1979. Combines and forage harvesters showed sharp decreases. In Canada, mower conditioner sales for the month were on the plus side and combine sales were up almost 13 per cent over the previous month, according to the Canadian FIEI. Figures for October and the first ten months of the year are:

Unit Retail Sales

Equipment	October 1980	October 1979	October Pct. Change	January-October 1980	January-October 1979	January-October Pct. Change
Farm Wheel Tractors						
2-wheel drive						
40-100 hp	6,584	7,438	-11.5	52,052	58,953	-11.7
Over 100 hp	7,217	8,447	-14.6	42,864	55,625	-22.9
Total 2-wheel drive	13,801	15,885	-13.1	94,916	114,578	-17.2
4-wheel drive	1,664	1,720	- 3.3	8,939	9,838	- 9.1
Total	15,465	17,605	-12.2	103,855	124,416	-16.5
Combines (S-P)	5,855	8,705	-32.7	21,574	28,644	-24.7
Balers*	1,138	1,728	-34.1	13,082	18,132	-27.9
Forage Harvesters**	1,787	3,289	-45.7	8,209	11,027	-25.6
Mower Conditioners	1,561	2,166	-27.9	17,915	24,583	-27.1
CANADIAN FIEI REPORT:						
Farm Wheel Tractors	5,043	5,323	- 5.3	25,811	26,845	- 3.9
Combines (S-P)	917	1,149	-20.2	3,448	4,609	-25.2
Balers*	382	440	-13.2	3,835	4,242	- 9.6
Mower Conditioners	315	258	22.1	4,020	4,494	-10.5

*Bales under 200 lbs. **Shear-bar type

NOW, SOME GOOD NEWS! Despite a 12- to 14-per cent increase in prices, Robert D. Reinsel of USDA's Economics and Statistics Service says farm equipment sales will increase sharply in 1981, probably reaching 1979 levels. Rising farm income, which is expected to continue rising in 1981, and interest rates that are expected to remain below 1980 levels, are reasons for the anticipated revival, according to Reinsel.

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I&T
SINCE 1886

AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

YODER & FREY, INC.
Archbold, Ohio
(November 11, 1980)

ALLIS-CHALMERS TRACTORS

7050 diesel, 1978 (Good)	10,500*
7030 diesel, 1976 (Good)	8500*
220 diesel, 1972 (Rough)	5100*
XT190 diesel, 1968 (Good)	6225
XT190 diesel, 1968 (Fair)	3000*
210 diesel, 1971 (Fair)	7500*
200 diesel, 1970 (Good)	8700*
190, 1968 (Rough)	2900*
180 diesel, 1967 (Good)	4900*
180, 1967 (Rough)	2600
D17, ldr., 1964 (Fair)	1900
D17, (Rough)	875
WC, (Rough)	200*

DAVID BROWN TRACTORS

990, 1962 (Fair)	1500*
990, 1955 (Rough)	550*

CASE TRACTORS

1370 diesel, (Good)	10,750*
1170 diesel, 1974 (Fair)	5950*
1030 diesel, 1964 (Good)	4350*
1030 diesel, 1964 (Good)	3300
930, 1964 (Fair)	3100*
830, 1964 (Good)	1750
830, 1963 (Fair)	1950*
800, (Rough)	590
400, 1955 (Fair)	700
300, cult., 1955 (Rough)	725*

JOHN DEERE TRACTORS

4520 diesel, 1969 (Fair)	8200*
4430 diesel, 1976 (Excellent)	16,500
4320 diesel, 1971 (Good)	11,650
4230 diesel, 1973 (Good)	13,000
4020 diesel, 1967 (Good)	6500
4020 diesel, 1965 (Fair)	6200*
4020 diesel, 1965 (Fair)	5800*
4010 diesel, 1962 (Good)	5700*
4010 diesel, 1962 (Good)	5200
4010, 1963 (Good)	3500
4010 1961 (Fair)	3100*
3020, 1967 (Good)	4800
3020, 1967 (Good)	3600*
3020 diesel, ldr., 1966 (Good)	5750*
3020, 1965 (Fair)	3200
3010, ldr., 1963 (Fair)	2900*
3010, 1962 (Fair)	2700
2020, 1966 (Good)	4125
2010 diesel, backhoe, ldr., (Fair)	3300
1020, ldr., 1967 (Fair)	3075*
500, backhoe, ldr., (Fair)	4500*
830 diesel, 1960 (Fair)	2200*
720 diesel, 1960 (Good)	1900
720, 1960 (Fair)	1700*
620, 1958 (Good)	1900*
520, 1957 (Fair)	1000*
70, 1956 (Fair)	900*
70, 1956 (Rough)	900*
70, 1954 (Rough)	760*
60, 1954 (Fair)	825*
60, 1952 (Rough)	700
50, 1954 (Fair)	975
40, 1956 (Fair)	1300
B, 1947 (Good)	610

FORD TRACTORS

9000 diesel, 1971 (Good)	9500
5000, 1974 (Fair)	5250*
5000 diesel, 1952 (Fair)	4900
5000, 1970 (Rough)	2950
4000, 1971 (Fair)	3150*
4000 diesel, 1969 (Rough)	1900*
3000, 1971 (Good)	4800*
3000, 1970 (Fair)	3600*
2600, (New)	5900*
2000, (Fair)	1750
2000 diesel, 1954 (Fair)	1275*
901, 1958 (Fair)	1200*
901,	885
850, 1956 (Rough)	1400*
801,	1130
800, 1956 (Fair)	1410*
541, 1950 (Fair)	1250*
Maj., 1956 (Good)	1580
Dexta, 1955 (Rough)	1025
Jub., 1953 (Fair)	1600
Jub., 1953 (Fair)	1160
8N, 1952 (Rough)	820
8N, 1950 (Rough)	950
8N, 1947 (Rough)	950
9N, 1946 (Good)	1325*
9N, 1945 (Rough)	800
9N, ldr., 1945 (Rough)	700*
9N, ldr., bld., 1944 (Fair)	1100*
9N, 1944 (Good)	990

INTERNATIONAL HARVESTER TRACTORS

1568 diesel, 1974 (Good)	10,600*
1466 diesel, 1972 (Fair)	9500*
1456 diesel, 1968 (Fair)	4700
1086 diesel, 1978 (Good)	17,400*
1066 diesel, 1973 (Excellent)	11,100
1066 diesel, 1972 (Good)	8300*
1066 diesel, 1972 (Fair)	8150
Hydro 100, 1976 (Excellent)	10,600*
986 diesel, (Excellent)	18,000
856 diesel, 1967 (Good)	7450
826, 1975 (Good)	7700*

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Auctions

(continued)

806 diesel, 1965 (Fair)	5500*
806 diesel, 1965 (Fair)	4800*
806, 1964 (Fair)	3600
806, 1963 (Fair)	3000*
656, 1967 (Fair)	3700
606, 1969 (Rough)	1900*
560, 1960 (Good)	1950*
560, 1960 (Good)	1750
560 diesel, 1959 (Rough)	1150
460, 1960 (Fair)	1600
400, (Fair)	750
3414, ldr., (Fair)	3450
B250, 1957 (Fair)	725*
Sup. M, (Rough)	525*
M, 1951 (Fair)	825
M, 1948 (Good)	920
M, 1947 (Fair)	740
M, 1945 (Rough)	630
H, 1946 (Good)	650
A, 1952 (Fair)	870
A, cult., 1950 (Rough)	510
Sup. C, 1952 (Fair)	725*
C, 1950 (Fair)	975
C, 1950 (Rough)	600*
C, cult., 1949 (Fair)	600

MASSEY-FERGUSON TRACTORS

3165, ldr., 1970 (Fair)	3800*
2135, ldr., 1964 (Fair)	3300*
1155, 1974 (Fair)	9400
1135, 1976 (Fair)	7500*
1100, 1970 (Fair)	3200*
1080, 1974 (Rough)	4450
210, 4WD, (New)	4075
180, 1970 (Fair)	3600*
180 diesel, 1970 (Rough)	3125
180, 1970 (Good)	3600*
175 diesel, 1967 (Good)	3800*
165, 1967 (Fair)	3550*
165, 1965 (Fair)	3300*
65, ldr., 1960 (Good)	2900*

MINNEAPOLIS-MOLINE TRACTORS

G1000 Vista diesel, 1967 (Fair)	5500
G900, 1968 (Fair)	3850*

OLIVER TRACTORS

1800 diesel, 1962 (Fair)	2575
1750, 1967 (Fair)	5000
1600, 1963 (Fair)	3050
880, 1957 (Fair)	1075*
880, ldr., (Rough)	700
Sup. 99 diesel, 1953 (Fair)	660*
Sup. 88, 1950 (Rough)	700*
88 diesel, 1952 (Fair)	825*
88, 1952 (Rough)	550

WHITE TRACTORS

4-180 diesel, 1976 (Fair)	15,500*
4-150 diesel, 1972 (Fair)	13,000*

NOTES

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.

Prices reported are NOT averages.

Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

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Bright 1981 Outlook in Canada

■ A SIGNIFICANT increase in farm equipment retail sales is projected in the Canadian market, based on the 1981 industry outlook report issued by the Canadian Farm & Industrial Equipment Institute.

The outlook report, prepared by the CFIEI marketing committee, was presented at the annual meeting of the Institute Nov. 4 in Toronto, and shows projected increases in all but three categories—swathers, small balers and forage harvesters—over 1980 figures. However, some of the 1981 projections still are short of 1979 actual sales figures.

Tractor sales and projections, including information on front-wheel assist units, are presented in the accompanying box. Figures and projections for other types of equipment are tabulated on the facing page.

Canadian Farm Tractor Retail Sales: 1979, 1980, 1981

Type, Size	2WD, 9-19 hp			2WD, 20-39 hp		
Year	**1979**	**1980**	**1981**	**1979**	**1980**	**1981**
Total	1,035	1,275	1,450	2,900	2,800	3,025

Type, Size	2WD, 40-99 hp			2WD, 100 hp & over		
Year	**1979**	**1980**	**1981**	**1979**	**1980**	**1981**
East	10,150	9,350	9,625	2,125	1,800	1,925
West	4,225	4,125	4,175	7,150	6,375	6,775
Total	14,375	13,475	13,800	9,275	8,175	8,700

Type, Size	4WD, under 200 hp			4WD, 200 hp & over		
Year	**1979**	**1980**	**1981**	**1979**	**1980**	**1981**
Total	1,730	1,635	1,750	1,535	1,465	1,600

Type, Size	2WD, front-wheel assist, all hp*			All Farm Tractors, 20 hp & over		
Year	**1979**	**1980**	**1981**	**1979**	**1980**	**1981**
East				14,875	13,825	14,550
West				15,975	15,000	15,775
Total	3,795	4,200	4,650	30,850	28,825	30,325

*Included in All Farm Tractors, but not in other 2WD groups.

Source: Canadian Farm & Industrial Equipment Institute, 720 Guelph Line, Suite 307, Burlington, Ont. L7R 4E2, tel. 416/632-8483.

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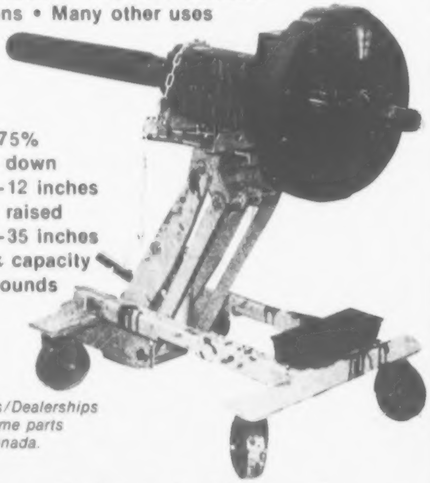

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Canadian 1981 Sales Outlook

Product	1979 (actual)	1980 (est.)	1981 (forecast)
S-P combines			
East	1,175	995	1,060
West	3,895	3,175	3,390
National	5,070	4,170	4,450
Cornheads	910	775	835
P-T combines	3,075	2,720	2,915
S-P swathers			
East	425	440	435
West	3,635	3,750	3,730
National	4,060	4,190	4,165
P-T swathers	3,215	3,660	3,315
Balers (small)			
East	2,465	2,440	2,305
West	1,930	1,600	1,575
National	4,395	4,040	3,880
Balers (big)			
East	290	345	400
West	2,875	2,775	2,960
National	3,165	3,120	3,360
Forage harvesters	1,705	1,715	1,705
Mower conditioners	4,685	4,295	4,375
Diskers	2,655	2,000	2,015
Chisel plows	4,675	3,985	4,130
Moldboard plows			
East	4,075	3,375	3,400
West	995	835	865
National	5,070	4,210	4,285
Disk harrows			
East	3,065	2,600	2,775
West	2.875	2,375	2,575
National	5,940	4,975	5,350
Grain drills			
East	2,200	1,915	1,950
West	6,000	5,175	5,225
National	8,200	7,090	7,175
Corn planters	1,705	1,500	1,670
Manure spreaders			
East	3,155	2,825	2,885
West	1,010	875	900
National . . .	4,165	3,700	3,785
Grinder-mixers	1,775	1,410	1,600

Source: CFIEI Industry Outlook '81

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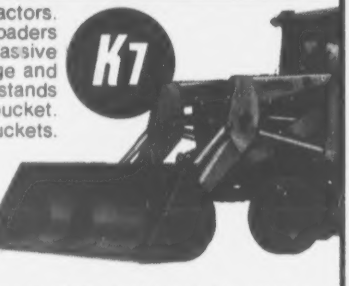
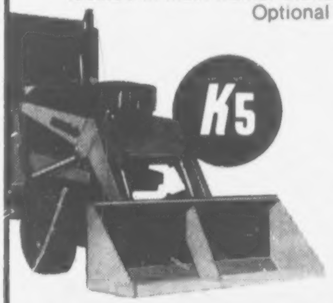
Big, super-rugged K-7 for 110 plus HP tractors. Combines best features of industrial loaders into high-performance farm loader. Massive main frame knee for unmatched leverage and strength. Top operator visibility. Loader stands located in main frame. Standard HD 7' bucket. Optional 8' and 9' buckets.





Super-strong K-5 designed for extra-strength and stamina. Fits most tractors with cabs. Has big 18" deep main frame knee and massive 3-point wrap-around sub-frame. Rugged . . . almost one ton of steel. Big 7' twin-cylinder bucket standard. (Optional 5' and 8' buckets available.)

K-2 . . . the "work-horse" for tractors up to 60HP . . . fits most tractors with cabs. Has strength and stamina to handle toughest loading and moving jobs around the farm. Low-profile, compact. Accessories include twin-cylinder bucket, snow scoop extension, grapple fork.

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SEARCH FOR SAFETY

ASAE's 10-year accident reduction program: what has happened?

starts on page 9

in the I&T Manufacturers Edition
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January 7, 1981 • Vol. 96 • No. 1

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

16th Engineering Concepts Issue

A Look at Ag Engineers' Accident-Reduction Program

9: **Introduction**

10: **Accident-Reduction.** At its winter meeting in Chicago, the American Society of Agricultural Engineers assessed the progress made in its 10-year effort to reduce farm-work accidents, and the opportunities that remain.

12: **Who Pays the Bill?** The equipment designer, manufacturer, dealer and consumer share directly or indirectly in increased costs, lost time, and in other ways, in product liability cases that often result from misuse of equipment.

16: **An Irrational Problem.** Several speakers agreed that people are the least predictable aspect of accident prevention and that efforts must continue to create a greater safety awareness among farm workers.

20: **Author's Viewpoint.** I&T's technical writer and ag engineer, Frank Buckingham, offers some personal observations on the ASAE accident-reduction program and calls for more voluntary safety activities to meet existing safety problems to reduce the possibility of government-dictated programs.

On the cover... Massey-Ferguson technicians prepare a roll-over protective structure (ROPS) for a crush test at their testing site in Michigan.

DEPARTMENTS

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what's ahead...

SINCE 1886

January 7, 1981

AFTER A TERRIBLE OCTOBER, RETAIL SALES JUMPED IN NOVEMBER, according to the Flash Report of the Farm & Industrial Equipment Institute. Tractor sales in October, for instance, were off 12.2 per cent, compared with the same month last year, but November was up by 57 per cent in that category. Sales of tractors for the year to date were down 13.4 per cent at the end of November. (The May forecast of the Marketing & Management Conference saw a decline for the year of 10.7 per cent in tractor sales.) Why the yo-yo effect? One insider suggests several possible reasons: 1. November of 1979 was a weak sales month, heightening this year's percentage of improvement. 2. Many fiscal years start Nov. 1, and since 1980 was destined to go into the books as such a disaster, some sales may have been held up to get 1981 off to a good start. 3. Everyone, particularly Deere, was promoting sales very heavily in November. Other factors: There were warnings that interest rates would soon be taking off (which they did); farm prices were pretty good. Here's the flash report:

Unit Retail Sales

	November			January-November		
	1980	1979	Pct. Change	1980	1979	Pct. Change
Farm Wheel Tractors:						
2-wheel drive						
40-100 hp	3,028	2,447	+ 23.7	55,080	61,400	-10.3
Over 100 hp	4,654	2,502	+ 86.0	47,518	58,127	-18.3
Total 2-wheel drive	7,682	4,949	+ 55.2	102,598	119,527	-14.2
4-wheel drive	1,038	618	+ 67.9	9,977	10,456	- 4.6
Total Tractors	8,720	5,567	+ 56.6	112,575	129,983	-13.4
Combines (S-P)	2,472	1,670	+ 48.0	24,046	30,314	-20.7
Balers*	526	268	+ 96.2	13,608	18,400	-26.1
Forage Harvesters**	914	999	- 8.6	9,123	12,026	-24.2
Mower Conditioners	803	378	+112.4	18,718	24,961	-25.1

*Bales under 200 lbs. **Shear-bar type.

SWEDEN AIMS AT CUTTING ITS PETROLEUM IMPORTS IN HALF within 20 years by boosting its production of ethanol from sugar beets, feed grains and potatoes. Under the plan, 8 per cent of its total arable land--617,500 acres--will go into the project.

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I&T
SINCE 1886

AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

JONES FARM EQUIPMENT CO.
Dothan, Alabama
(November 11, 1980)

ALLIS-CHALMERS TRACTORS

5040 diesel, 1980 (Excellent)	6200*
5040 diesel, 1980 (Excellent)	6200*
CA, 1953 (Fair)	575

CASE TRACTORS

930 diesel, cab, 1964 (Fair)	1600*
730 diesel, 1962 (Fair)	1100*
480 diesel, (Rough)	850
380 diesel, 1975 (Excellent)	3550

DAVID BROWN TRACTORS

1212 diesel, 1975 (Fair)	2400
1210 diesel, 1974 (Good)	3525
990 diesel, 1968 (Good)	2300*
990 diesel, 1968 (Good)	2300
990 diesel, 1967 (Fair)	1500*
885 diesel, 1975 (Excellent)	2900

DEUTZ TRACTOR

5206 diesel, (Good)	5150

MASSEY-FERGUSON TRACTORS

1155 diesel, cab, duals, 1975 (Good)	8800*
1130 diesel, 1968 (Fair)	3275
1105 diesel, cab, 1977 (Excellent)	10,100
245 diesel, 1977 (Excellent)	6600
230 diesel, 1977 (Excellent)	4950
203 diesel, 1964 (Good)	1900
180 diesel, 1968 (Good)	3000*
180 diesel, 1968 (Good)	3000
180 diesel, 1967 (Fair)	2675
175 diesel, 1972 (Fair)	2750
175 diesel, 1969 (Good)	3700*
175 diesel, 1968 (Good)	3400*
175 diesel, 1968 (Good)	3500*
175 diesel, 1968 (Good)	3550
175 diesel, 1967 (Good)	3500*
175 diesel, 1967 (Fair)	2700
175 diesel, 1967 (Fair)	2800*
175 diesel, 1966 (Fair)	2950*
165 diesel, 1973 (Rough)	2100
165 diesel, 1972 (Good)	3700*
165 diesel, 1971 (Fair)	2950*
165 diesel, 1970 (Good)	3200*
165 diesel, 1969 (Rough)	2100
165, 1969 (Fair)	2700*
165 diesel, 1967 (Rough)	2300*
165 diesel, 1967 (Good)	3300
165 diesel, 1967 (Rough)	1725
165 diesel, 1967 (Good)	3300*
165 diesel, 1967 (Good)	3400
165 diesel, 1967 (Good)	2950*
165 diesel, 1967 (Fair)	2900*
135, 1968 (Good)	2900
135 diesel, 1967 (Fair)	2600
135 diesel, 1967 (Good)	3250
65 diesel, 1962 (Fair)	1150
65 LP, 1962 (Good)	1725
65 diesel, 1958 (Good)	1650
50, 1958 (Good)	1950
35 diesel, 1963 (Good)	2000
35, 1960 (Good)	1525
35 diesel, 1959 (Good)	1025
35 diesel, 1959 (Fair)	700
35, 1959 (Excellent)	2100
35, 1957 (Good)	1500
35, 1957 (Good)	1450*
TO30, 1952 (Good)	975
TO30, 1952 (Fair)	825
TE20, 1949 (Rough)	625

FORD-FERGUSON TRACTORS

9N, mo., 1946 (Fair)	700
9N, 1944 (Good)	825
9N, 1944 (Fair)	700
9N, 1940 (Good)	850

FORD TRACTORS

8600 diesel, 1976 (Good)	7050
8600 diesel, 1975 (Good)	7500*
8000 diesel, 1972 (Good)	5300*
7000 diesel, 1972 (Good)	5900*
7000 diesel, 1972 (Good)	6150*
5000 diesel, 1975 (Excellent)	6100
5000 diesel, 1974 (Excellent)	5800
5000 diesel, 1969 (Excellent)	5600
5000 diesel, 1968 (Good)	4000
5000 diesel, 1967 (Fair)	2400
5000 diesel, 1967 (Fair)	3100
5000 diesel, Select-O-Speed, 1966 (Rough)	1550
4000 diesel, 1968 (Excellent)	3900*
4000 diesel, 1966 (Fair)	2550
4000 diesel, 1963 (Good)	2100
3600 diesel, 1976 (Excellent)	5950
3000 diesel, 1971 (Excellent)	3600
3000 diesel, 1970 (Good)	3400
3000 diesel, 1970 (Fair)	2900
3000 diesel, 1968 (Rough)	1800
3000 diesel, 1968 (Good)	3100
3000, 1965 (Good)	2800
861 diesel, 1961 (Good)	2000
861 diesel, 1959 (Good)	1875
841, 1959 (Fair)	1450*
641, 1959 (Fair)	1525*
641, 1959 (Fair)	1300
640, 1956 (Good)	1350

(More...)

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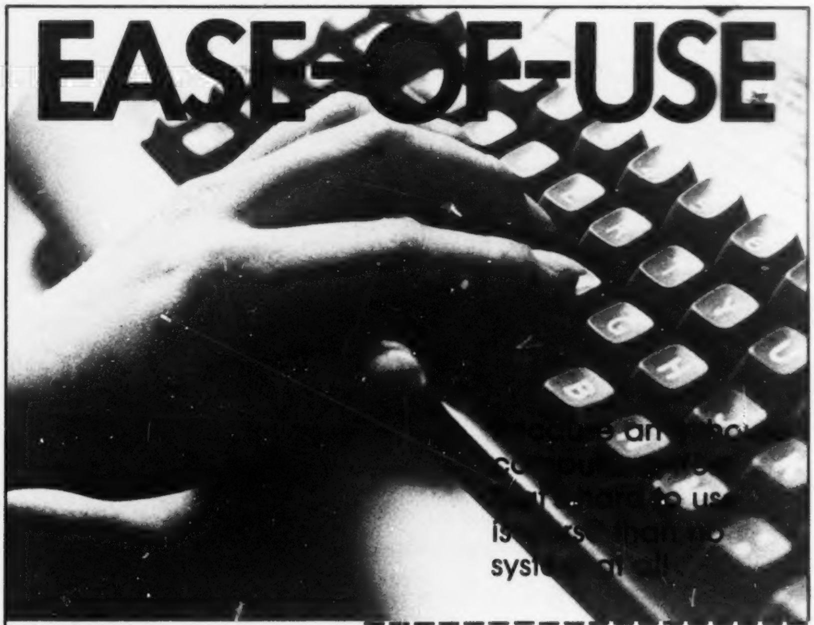
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Auctions *(continued)*

640, 1956 (Good)	1300
621, 1958 (Good)	1550
Sup. Maj. diesel, 1963 (Good)	1175
Sup. Dexta, 1963 (Good)	1850
Dexta, 1959 (Good)	1250
Dexta, 1959 (Good)	1000
8N, 1952 (Excellent)	1500*
8N, 1951 (Good)	1175
8N, 1951 (Good)	1350
8N, 1949 (Fair)	850
8N, 1949 (Fair)	975
8N, 1948 (Rough)	550*
8N, 1948 (Good)	1025

INTERNATIONAL HARVESTER TRACTORS

806 diesel, 1964 (Fair)	3400
656 diesel, 1967 (Fair)	2550
576 diesel, (Good)	3100*
574 diesel, 1973 (Good)	3650
574 diesel, 1973 (Rough)	875
544 diesel, 1973 (Fair)	1800*
504 diesel, 1964 (Rough)	825
460 diesel, 1959 (Rough)	850*
300, 1955 (Fair)	700
B275 diesel, 1959 (Good)	800
240, cotton picker, 1959 (Rough)	750*
C, 1948 (Fair)	435
140, 1961 (Good)	1475
154 Cub Loboy, 1969 (Fair)	1000*
Cub, mo., 1949 (Fair)	750
Cub, cult., plt., 1948 (Rough)	425
Cub, mo., 1948 (Rough)	650*
Sup. A, cult., plt., 1948 (Good)	1200
A, cult., 1944 (Good)	750
A, 1944 (Fair)	565

JOHN DEERE TRACTORS

4020 diesel, 1968 (Good)	6300*
4020 diesel, 1968 (Good)	5700
4010 diesel, 1963 (Fair)	2500
3020 diesel, 1966 (Good)	4100*
3020 diesel, 1966 (Rough)	2600
3010, 1962 (Fair)	2650*
2510 diesel, 1967 (Good)	3850*
2040 diesel, 1977 (Good)	4550
2040 diesel, 1977 (Excellent)	6300
2030 diesel, 1974 (Fair)	3550
2020 diesel, 1968 (Good)	3700*
2020 diesel, 1968 (Good)	4000*
2020 diesel, 1968 (Good)	4000*
2010 diesel, 1964 (Fair)	1300*
2010 diesel, 1964 (Excellent)	2450
1120 diesel, (Good)	2900*
1020 diesel, 1966 (Good)	3425
1010, 1962 (Good)	1750*
1010 diesel, 1961 (Fair)	1250*
820 diesel, 1973 (Good)	3150*
420, 1957 (Good)	950
50 LP, 1953 (Fair)	400
40, 1954 (Fair)	625
M, 1949 (Good)	875

LONG TRACTORS

384 diesel, 1971 (Rough)	1050*
344 diesel, 1971 (Fair)	1650*

OLIVER TRACTORS

1755 diesel, 1973 (Good)	6100
1650 diesel, 1966 (Good)	2800*
550 diesel, 1964 (Good)	2000

BILL ENLOW TRACTOR SALES

Tulsa, Oklahoma

(November 14, 1980)

ALLIS-CHALMERS TRACTORS

WD, 1949 (Fair)	525
D-14, 1958 (Good)	1700
D-17, LP, 1963 (Fair)	1600
D-19 diesel, 1962 (Good)	2600
5020 diesel, 1980 (Good)	3500*

CASE TRACTORS

DC-4, 1953 (Fair)	100*
DC-4, 1953 (Fair)	170*
320, 1957 (Good)	1375*
830 diesel, 1965 (Good)	2100
970, 1973 (Good)	6400
580-B, backhoe, 1968 (Good)	6850*
580-B diesel, backhoe, 1974 (Excellent)	10,500

FERGUSON TRACTORS

20, 1949 (Fair)	875
30, 1951 (Good)	1100
30, 1953 (Good)	1050

FORD TRACTORS

9N, 1940 (Fair)	800
9N, 1941 (Fair)	700
9N, 1942 (Good)	900
9N, 1942 (Fair)	750
9N, 1944 (Good)	1000
9N, 1944 (Good)	900
9N, 1944 (Rough)	500
9N, 1944 (Fair)	775*
9N, 1945 (Good)	1050
9N, 1945 (Good)	1150
9N, ldr., 1946 (Good)	1400
9N, 1946 (Good)	1400
8N, 1947 (Good)	1200*
8N, 1948 (Fair)	1100
8N, 1948 (Good)	1200
8N, 1949 (Fair)	1075*
8N, 1949 (Good)	1350
8N, 1949 (Good)	1300
8N, 1950 (Good)	1350
8N, 1950 (Good)	1450
8N, 1951 (Good)	1350
8N, 1951 (Good)	1500
8N, 1952 (Good)	1525
8N, 1952 (Good)	1325
8N, 1952 (Good)	1900
NAA, 1953 (Fair)	1250
NAA, 1953 (Fair)	1500
NAA, 1953 (Fair)	1300
NAA, 1953 (Good)	1700*
600, ldr., 1954 (Good)	2000
640, 1954 (Fair)	1400*
601, 1959 (Fair)	1300
800, 1954 (Good)	2000
800, 1955 (Good)	1800*
800, 1955 (Good)	1850
800, 1955 (Good)	1900*
800, 1956 (Good)	2350
800, 1956 (Good)	2500*
800, 1957 (Good)	1600
860, 1957 (Good)	1925*
801, 1961 (Good)	2000
900, 1956 (Fair)	1150
Dexta diesel, 1960 (Fair)	1250
Fordson Mjr. diesel, 1955 (Rough)	800
Fordson Mjr. diesel, 1957 (Rough)	900*
1700 diesel, 1980 (Excellent)	4050
3000, 1965 (Fair)	2200
3000, 1965 (Good)	2550
3000 diesel, 1968 (Good)	3100*
3000 diesel, 1969 (Good)	3250
3000 diesel, 1970 (Good)	3300
4000, 1962 (Rough)	1350
4000, 1963 (Fair)	1950
4000, ldr., 1963 (Fair)	1750
4000 diesel, 1969 (Good)	3400
4000 diesel, 1970 (Good)	3200*
4000, 1971 (Good)	3000*
4000, backhoe, 1968 (Fair)	3250*
4400, 1969 (Fair)	2850*
5000 diesel, Select-O-Speed, 1967 (Rough)	1950
5000 diesel, bld., 1970 (Fair)	3300
9000 diesel, 1973 (Good)	7100*

INTERNATIONAL HARVESTER TRACTORS

Cub-154 Loboy, 1968 (Fair)	1900*
A, 1946 (Good)	850
H, 1951 (Good)	410*
M, 1947 (Good)	400*
300, 1954 (Good)	1750
300, 1956 (Fair)	1400*
340, 1959 (Good)	1750
3414 diesel, backhoe, 1968 (Fair)	2800
3[illegible]4, 1976 (Fair)	2000
806 diesel, 1967 (Good)	4850
1066 diesel, cab, 1973 (Good)	8750
1466 diesel, 1972 (Fair)	6000
1566 diesel, cab, duals, 1975 (Good)	12,300

JOHN DEERE TRACTORS

G, 1946 (Fair)	400*
60, 1954 (Fair)	800
70, 1955 (Good)	1600
420, 1957 (Fair)	900
730, 1959 (Fair)	975
2010, 1961 (Rough)	1200
2010, 1962 (Fair)	[illegible]
3010 diesel, 1963 (Good)	[illegible]
4520 diesel, 1970 (Fair)	3950

LEYLAND TRACTORS

344 diesel, 1970 (Good)	2000*

LONG TRACTOR

R-9500 diesel, 1972 (Fair)	2000

MASSEY-HARRIS TRACTORS

Pony, 1952 (Good)	350
30, 1951 (Fair)	325

MASSEY-FERGUSON TRACTORS

35 diesel, 4-cyl., 1958 (Fair)	1400
35, 1959 (Good)	1700*
35, 1959 (Good)	1785*
35, 1960 (Good)	1950
35, 1960 (Good)	2150
35, 1960 (Good)	2150
35 diesel, 1961 (Good)	2300
35, 1963 (Good)	2450
35 diesel, 1963 (Good)	2800
50, 1958 (Good)	2000
50, 1958 (Fair)	1700
65, 1959 (Fair)	1650
65, 1959 (Fair)	1700
65, 1961 (Good)	2000*
65, 1962 (Good)	2200*
65 diesel, 1962 (Good)	2750
65 diesel, ldr., 1963 (Good)	3300
85 diesel, 1961 (Fair)	1550
S-90 diesel, 1963 (Good)	1800
S-90 diesel, 1964 (Fair)	1725
135, 1965 (Good)	2800*
135, 1969 (Good)	3050
165 diesel, 1965 (Good)	2900*
165 diesel, 1966 (Good)	3000
165 diesel, 1966 (Good)	3300
165 diesel, 1967 (Good)	3450
165 diesel, 1967 (Good)	3450
165 diesel, 1968 (Good)	3550
175 diesel, 1967 (Fair)	1950
175 diesel, 1968 (Good)	3000
175 diesel, 1968 (Good)	3350
175 diesel, 1969 (Good)	3300*
180 diesel, 1966 (Fair)	2750
180 diesel, 1967 (Good)	3575
180 diesel, 1967 (Good)	3400
180 diesel, 1969 (Good)	3550
180 diesel, 1969 (Good)	3600
230 diesel, 1978 (Good)	5450
230 diesel, 1980 (New)	6850
235 diesel, 1975 (Good)	3900
245 diesel, 1977 (Good)	6100
245 diesel, 1978 (Good)	6100
275 diesel, 1980 (New)	12,050*
285 diesel, 1980 (New)	13,000*
1100 diesel, 1967 (Good)	5350
1100 diesel, 1969 (Good)	5500
1135 diesel, 1974 (Good)	6150
20 C, ldr., 1970 (Good)	4850
30, ldr., 1972 (Good)	5250
200, ldr., 1972	4550
40, ldr., 1975	5350

NUFFIELD TRACTOR

3/45 diesel, 1968 (Good)	2100

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news briefs

(continued)

Who Sells Big Tractors, Combines? Chilton Estimates Market Shares

Researchers for Chilton Co., Radnor, Pa., publishing firm, recently came up with estimates of market shares for companies selling tractors of 100 hp or more and self-propelled combines in North America.

North American Retail Sales

Company	Unit Sales	Estimated Shares (Pct.)
Two-Wheel Drive Tractors over 100 HP		
John Deere	27,419	37
International Harvester	18,526	25
J I Case	9,634	13
Allis-Chalmers	5,928	8
White Farm	4,446	6
Massey-Ferguson	3,705	5
Ford	3,705	5
Others	742	1
Four-Wheel-Drive Tractors		
Versatile	3,008	21
International Harvester	2,722	19
John Deere	2,436	17
J I Case	2,292	16
Steiger	1,719	12
White Farm	716	5
Allis-Chalmers	573	4
Massey-Ferguson	430	3
Ford	287	2
Others	143	1
Self-Propelled Combines		
John Deere	12,210	33
Massey-Ferguson	7,400	20
International Harvester	7,400	20
Allis-Chalmers	5,180	14
White Farm	2,220	6
Sperry New Holland	1,480	4
Ford	370	1
Canadian Co-Op Impls.	370	1
Avco New Idea	370	1

Massey Had Deficit of $225 Million On 1980 Sales of $3.13 Billion

Saying that it "closed its accounts for 1980 as a going concern on the basis that its refinancing plan will be accomplished," Massey-Ferguson Ltd. reported that it had a loss of $225 million (U.S.) for the fiscal year (ended Oct. 31), compared with a $37 million profit in 1979, on sales of $3.13 billion. Sales in 1979 were $2.97 billion.

Key contributors to the loss, according to MF, were interest on short-term debt—$229.9 million vs. $128.8 million in 1979; reorganization expense of $28.5 million (representing a provision for termination of about 1,600 employees), and net foreign exchange losses of $57.6 million.

Fourth quarter sales in North America fell 32 per cent to $200 million from $292 million in the same 1979 period. For all of fiscal 1980, however, they declined only 2 per cent from $1.06 billion to $1.04 billion. North American sales problems were attributed to plant closings, competitive pressure and uncertainty surrounding its proposed $700 million (Canadian) equity refinancing plan.

The company forecasts a loss of about $100 million in the first quarter of the 1981 fiscal year.

Robot to Tell New Holland Story

INNO-Vator, a robot, will be on hand at Sperry New Holland's exhibit at the National Farm Machinery Show in Louisville, Ky., beginning Feb. 11, to "talk" about the electronic and computerized technology used in the company's farm equipment. A company spokesman said INNO is not merely a pre-programmed robot who will deliver canned talks, but is a multilingual robot capable of intelligent conversation, wit and robotic emotions that are similar to human emotions. INNO has a complete music recall and pronouncer circuit and can dance, the spokesman added.

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Special section starts on page I-1

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INTERTEC PUBLISHING CORP.

January 21, 1981 • Vol. 96 • No. 2

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

Here Comes Italian Farm Equipment

I-4: **Introduction.** An exclusive I&T report about Italy's farm equipment industry and efforts to expand its significance in the world.

I-8: **Pioneering with SAME.** How two dealers with imagination and willingness to try something new added the SAME tractor line and applied its features to customer needs.

I-12: **EIMA.** This annual exhibition in Bologna showcases the products of Italian and other farm equipment manufacturers in a unique manner.

I-22: **From Shortliner to Major.** Hesston delivers its first Fiat tractor and enters the competitive North American tractor market.

I-30: **Distributors** that handle Italian agricultural equipment in America.

I-32: **Italian Manufacturers** that will display equipment at upcoming shows in Oregon and California.

8: **Monitoring Can Aid in Selection.** Use of a tractor monitor to measure performance of present equipment helps in selecting and matching tractors and implements for future purchase and applications.

12: **Massey-Ferguson** sought dealer input when developing its management training program.

22: **Promotion.** Farm equipment manufacturers and dealers actively promote the story of agriculture and focus attention on the national Agriculture Day observance—March 19.

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AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

YODER & FREY, INC.
Archbold, Ohio
(December 9, 1980)

ALLIS-CHALMERS TRACTORS

210 diesel, 1971 (Fair)	8100*
XT190 diesel, 1969 (Fair)	5300*
XT190 diesel, 1968 (Fair)	2900*
190, 1968 (Rough)	2800
7050 diesel, (Good)	10,000
7030 diesel, 1976 (Fair)	9000*
D21 diesel, 1965 (Fair)	4700*
D19, 1963 (Fair)	2400
D17, 1964 (Rough)	1700
D14, 1963 (Fair)	1500
WD45, 1956 (Good)	900
WD, plow, 1952 (Fair)	675
WD, (Fair)	575*

DAVID BROWN TRACTORS

1200 diesel, 1967 (Rough)	2900*
1200 diesel, 1964 (Fair)	3200
990, 1960 (Fair)	1700*
990, 1960 (Rough)	925

CASE TRACTORS

995 diesel, (New)	8750*
930, 1963 (Fair)	3200
900 diesel, 1959 (Good)	1875
830 diesel, 1964 (Good)	3150
800, 1959 (Fair)	850*
730, 1963 (Rough)	1000
430, 1964 (Fair)	1400*
400, 1955 (Rough)	600*

JOHN DEERE TRACTORS

4630 diesel, 1978 (Fair)	11,950
4520 diesel, 1969 (Fair)	7750*
4430 diesel, 1975 (Good)	11,900*
4320 diesel, 1971 (Fair)	8850
4230 diesel, (Excellent)	12,600
4230 diesel, 1976 (Good)	11,900
5020 diesel, 1969 (Fair)	7200*
4030 diesel, 1973 (Good)	8900*
4020 diesel, 1970 (Good)	8800*
4020 diesel, 1970 (Good)	8500*
4020 diesel, 1970 (Fair)	6950
4020 diesel, 1967 (Fair)	5400*
4020, 1964 (Fair)	3250
4010 diesel, 1962 (Good)	5625*
3020 diesel, 1967 (Fair)	6300*
3020 diesel, 1966 (Good)	6200
3020, cab, 1967 (Fair)	3800*
3020, 1966 (Good)	4300
3020, 1966 (Good)	3500*
3010, ldr., 1964 (Fair)	3350
3010, 1963 (Fair)	3700*
3010, 1962 (Rough)	3000*
2240, ldr., 1978 (Fair)	8800*
2120 ldr., 1973 (Good)	5450
2010, ldr., 1963 (Fair)	3100
1020, 1967 (Fair)	3000*
1010, ldr., 1963 (Rough)	2175
830 diesel, 1958 (Fair)	2200*
730, 1960 (Good)	2500
730 diesel, 1957 (Fair)	2050
730 diesel, 1957 (Fair)	1800
720, 1956 (Fair)	1700*
620, 1956 (Fair)	1850
520, 1956 (Fair)	1400*
70, 1955 (Rough)	600
70, 1954 (Fair)	875
70 diesel, 1953 (Fair)	900*
70, 1952 (Fair)	850*
60, 1953 (Good)	925
60, 1953 (Fair)	750
60, 1952 (Fair)	650*
50, 1954 (Good)	925
40, 1954 (Good)	1225
40, 1956 (Good)	1000
A, 1951 (Rough)	450
A, 1951 (Good)	700
B, 1950 (Fair)	550
B, 1945 (Fair)	350

FERGUSON TRACTORS

30, ldr., 1947 (Fair)	1600*
30, 1946 (Fair)	850*

FORD TRACTORS

8000 diesel, 1970 (Good)	6150
6000, 1965 (Fair)	1800*
5000, 1972 (Fair)	3700
5000 diesel, 1970 (Fair)	3000
5000 diesel, 1970 (Good)	3000
4000, 1972 (Good)	4900
4000, 1972 (Fair)	4525
4000, 1971 (Fair)	3775
4000 diesel, 1971 (Rough)	2800*
4000, 1970, (Fair)	2375*
3600 diesel, 1979 (Excellent)	6600
3400, ldr., 1970 (Good)	3500*
3000, 1973 (Good)	4000
3000, 1971 (Fair)	3150
541, 1954 (Fair)	1350*
Sup. Dexta, 1960 (Good)	1200
Jub., 1953 (Rough)	1100
8N, 1950 (Fair)	1300*
8N, 1952 (Fair)	1200
8N, ldr., 1951 (Fair)	1150*
8N, 1951 (Fair)	1025*
8N, 1951 (Rough)	1000
8N, 1950 (Rough)	1000*
8N, 1950 (Fair)	925*
8N, 1949 (Fair)	800
9N, 1945 (Good)	975
9N, 1944 (Fair)	860

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Auctions *(continued)*

INTERNATIONAL HARVESTER TRACTORS

1486 diesel, 1978 (Good)	19,400*
1466 diesel, 1972 (Good)	12,000
1466 diesel, 1972 (Good)	11,200
1466 diesel, 1972 (Fair)	9300*
1466 diesel, 1971 (Fair)	8750
1456 diesel, 1967 (Good)	11,250*
1086 diesel, 1978 (Excellent)	17,800
1066 diesel, 1972 (Good)	9700*
1066 diesel, 1972 (Good)	8750*
836 diesel, duals, 1970 (Fair)	7300*
826 diesel, 1974 (Good)	7400*
806 diesel, 1965 (Fair)	5800*
806 diesel, 1965 (Fair)	5350
806, 1965 (Fair)	3175
806 diesel, 1964 (Fair)	6200
806 diesel, 1964 (Fair)	6100*
806 diesel, 1964 (Fair)	4950
806 diesel, 1964 (Fair)	4550
706, 1965 (Fair)	2950
656, hydro., 1967 (Fair)	3050
606, 1963 (Rough)	1150
560, 1960 (Fair)	1600
560 LP, (Rough)	825
504, 1968 (Good)	2750
504, 1967 (Fair)	1325
400 diesel, 1956 (Good)	1175
350, ldr., 1957 (Fair)	900
330, ldr., 1960 (Fair)	1000*
300, 1956 (Fair)	1075
240, 1964 (Fair)	950*
Sup. MTA, 1952 (Fair)	1425
Sup. M, 1952 (Good)	1000*
Sup. M, 1952 (Fair)	875
Sup. M, 1952 (Good)	1425
M diesel, 1951 (Fair)	860
M, 1951 (Fair)	900
M, 1949 (Fair)	700
M, 1948 (Fair)	575
H, 1950 (Good)	770
H, 1949 (Rough)	525
H, ldr., 1947 (Fair)	750
H, 1947 (Fair)	700
B250, 1957 (Fair)	725
Sup. C, 1951 (Fair)	725
C, 1950 (Rough)	630
A, 1948 (Fair)	825*
Cub, 1948 (Fair)	975

MASSEY-FERGUSON TRACTORS

2675 diesel, 1979 (Good)	17,700
1900 diesel, 1974 (Fair)	9600*
1130 diesel, 1969 (Good)	6400
285 diesel, 1978 (Good)	9150*
265 diesel, 1979 (Good)	7925*
265 diesel. 1979 (Good)	6025
230, (New)	5900*
180, 1970 (Fair)	3650
180 diesel, 1970 (Fair)	3200*
165 diesel, ldr., 1966 (Fair)	4400*
165 diesel, 1965 (Fair)	3100
165, 1965 (Excellent)	2450
165, 1964 (Rough)	1875
135, 1972 (Excellent)	9800*
135, 1968 (Fair)	3300*
135, 1966 (Fair)	2200
65, ldr., 1962 (Good)	2400*
65 diesel, 1958 (Fair)	2575
35, ldr., 1963 (Fair)	3125*
35 diesel, 1963 (Rough)	1900*
35 diesel, 1962 (Fair)	1875
35, 1953 (Good)	1700
30, 1972 (Rough)	3000*
20, 1966 (Fair)	2300*
20, 1966 (Fair)	2200

MINNEAPOLIS-MOLINE TRACTORS

G1000 diesel, Vista, 1967 (Fair)	5100*
M602LP, 1960 (Fair)	1550
Jet Star 3, 1971 (Good)	2650

OLIVER TRACTORS

1850 diesel, 1967 (Fair)	3350*
1800, 1963 (Fair)	2550*
1800, 1962 (Fair)	2600*
1750 diesel, 1967 (Fair)	4375
1750, 1966 (Fair)	4900*
1600 diesel, 1964 (Fair)	3325
1550, 1964 (Fair)	3450
880, 1958 (Fair)	950*
550, ldr., 1956 (Rough)	1425
88, 1950 (Fair)	750*
Sup. 55, 1954 (Fair)	875

WHITE TRACTORS

4-180 diesel, 1974 (Fair)	14,000*
4-150 diesel, 1973 (Good)	15,000*

JONES FARM EQUIPMENT CO.
Dothan, Alabama
(December 9, 1980)

CASE TRACTORS

830 diesel, 1964 (Good)	1975
730 diesel, 1962 (Fair)	1000*
630, 1961 (Fair)	850*
580, ldr., backhoe, 1966 (Good)	4000*
VAC, 1950 (Fair)	125

DEUTZ TRACTOR

1006 diesel, 1975 (Good)	5650

DAVID BROWN TRACTORS

1212 diesel, 1973 (Good)	4300*
1200 diesel, 1967 (Good)	2050
990 diesel, 1969 (Good)	2300*
990 diesel, 1968 (Excellent)	2900
990 diesel, 1965 (Good)	1700*
990 diesel, 1965 (Rough)	600

MASSEY-FERGUSON TRACTORS

1155 diesel, 1975 (Good)	6000*
1105 diesel, 1972 (Fair)	6550
1085 diesel, 1973 (Fair)	5300*
1085 diesel, 1973 (Good)	6100
285 diesel, 1975 (Good)	8050
180 diesel, 1967 (Good)	3600*
175 diesel, 1971 (Fair)	2250
175 diesel, 1969 (Good)	3550
175 diesel, 1969 (Good)	3100
175 diesel, 1967 (Good)	3300*
175 diesel, 1967 (Good)	3600
175 diesel, 1967 (Fair)	3000*
175 diesel, 1966 (Good)	3550
3165, 1966 (Rough)	1450
165 diesel, 1972 (Good)	3400
165 diesel, 1972 (Fair)	2350
165 diesel, 1971 (Good)	3300
165 diesel, 1971 (Good)	3200*
165 diesel, 1970 (Good)	3250*
165 diesel, 1970 (Good)	3000
165 diesel, 1969 (Fair)	2550
165 diesel, 1968 (Fair)	2550*
165 diesel, 1967 (Fair)	2450
165 diesel, 1967 (Good)	3100*
165 diesel, 1966 (Rough)	1625
165 diesel, 1966 (Rough)	1750
150 diesel, 1967 (Good)	2900*
150, 1965 (Fair)	2200*
135 diesel, 1973 (Good)	3300*
135, 1969 (Fair)	2400*
135 diesel, 1968 (Good)	3000*
135 diesel, 1968 (Good)	3100
135 diesel, 1967 (Fair)	2150
135 diesel, 1967 (Good)	3000*
130 diesel, 1968 (Fair)	1650
65 diesel, 1960 (Good)	1625
50 diesel, ldr., backhoe, 1973 (Excellent)	5750
50 diesel, ldr., backhoe, 1973 (Excellent)	5700
50 diesel, ldr., backhoe, 1977 (Excellent)	6000*
50, 1958 (Good)	1600
35 diesel, 1962 (Good)	1800*
35 diesel, 1961 (Good)	2100*
20 diesel, 1977 (Excellent)	5000*

FORD-FERGUSON TRACTORS

9N, 1944 (Good)	900
9N, 1944 (Fair)	750
9N, 1944 (Rough)	625

FORD TRACTORS

8600 diesel, 1974 (Good)	7500
7000 diesel, 1972 (Good)	5100
5000 diesel, 1970 (Good)	3850
5000 diesel, 1970 (Rough)	1900
5000 diesel, 1967 (Good)	3700*
4500 diesel, ldr., backhoe, 1971 (Good)	4500
4000 diesel, 1975 (Fair)	2700
4000 diesel, 1973 (Rough)	1550*
4000 diesel, 1972 (Fair)	2450*
4000 diesel, 1968 (Good)	3650*
4000, 1964 (Good)	1550
4000 diesel, 1963 (Good)	1950
4000 diesel, Select-O-Speed, 1963 (Fair)	1200
4000 diesel, 1963 (Fair)	1250
3600 diesel, 1979 (Excellent)	7700*
3600 diesel, 1979 (Excellent)	7600*
3000 diesel, 1973 (Good)	3200
3000 diesel, 1971 (Excellent)	4225
3000 diesel, 1970 (Good)	3050
3000 diesel, Select-O-Speed, 1967 (Rough)	1700
3000 diesel, 1967 (Fair)	2600*
3000 diesel, 1967 (Good)	2800
2600 diesel, 1979 (Excellent)	6800*
2600 diesel, 1979 (Excellent)	6700*
2000 diesel, 1973 (Good)	3000
2000 diesel, 1973 (Good)	2700
2000 diesel, 1972 (Excellent)	3350
2000 diesel, 1964 (Fair)	1350
2000, 1963 (Good)	1700*
1600 diesel, 1979 (Excellent)	3100*
860, 1956 (Fair)	1350*
841, 1959 (Fair)	1050*
841, ldr., 1958 (Fair)	1250
841, 1958 (Good)	1600
841, 1958 (Good)	1575
641, 1958 (Good)	1600
640, 1957 (Good)	1550*
640, fork-lift, 1956 (Fair)	1600
640, 1956 (Good)	1400
Sup. Dexta, 1962 (Good)	1350
NAA, 1954 (Fair)	1225*
NAA, 1954 (Fair)	1350
Jub., 1953 (Fair)	1250
8N, 6-cyl, 1952 (Good)	1525
8N, 6-cyl., 1952 (Good)	1400*
8N, 1950 (Good)	900
8N, 1950 (Good)	1075
8N, 1949 (Good)	1100
8N, 1949 (Fair)	750*
8N, 1949 (Good)	950*
8N, 1949 (Good)	900

INTERNATIONAL HARVESTER TRACTORS

1586 diesel, duals, 1978 (Excellent)	27,500*
1566 diesel, cab, duals, 1975 (Good)	8500
1256 diesel, 1968 (Good)	6450
1066 diesel, 1971 (Excellent)	7600*
656 diesel, 1968 (Fair)	2950*
574 diesel, 1972 (Good)	3300*
2504 diesel, ditcher/trencher, 1966 (Fair)	1450
2504, 1966 (Rough)	525
504 diesel, 1964 (Rough)	350*
504 diesel, 1962 (Good)	2050
460, 1959 (Fair)	800*
454, 1971 (Fair)	1900
424 diesel, 1965 (Good)	2350
B414 diesel, 1962 (Fair)	850
400 diesel, 1956 (Rough)	425

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Power Seeder -- 3 or 5 bushel capacities allow seeding 20 acres or more per hour.

Cement Mixer -- Our 1½ sack, 8 cu. ft. mixer goes anywhere a tractor can.

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Worksaver, Inc. P.O. Box 1000, Litchfield, Illinois 62056 Telephone: 217-324-5973

Circle (20) on Reply Card

354 diesel, 1974 (Fair)	2275
350 diesel, 1957 (Fair)	475
300, 1955 (Fair)	475
240, 1959 (Rough)	400
240, cotton picker, 1958 (Rough)	775
M, LP, corn picker, 1942 (Fair)	350
Sup. C, cult, plt, 1953 (Good)	825
C, 1950 (Good)	525
C, 1948 (Fair)	350
C, cult., 1948 (Good)	550
100, cult, plt, plow, har. 1955 (Good)	1775
154 Cub Loboy, mo., 1970 (Fair)	1050
Cub, mo., 1948 (Good)	700*
Cub, cult., 1948 (Good)	825

JOHN DEERE TRACTORS

5010 diesel, duals, 1964 (Good)	3600
4430 diesel, cab, 1976 (Excellent)	16,000*
4430 diesel, 1974 (Good)	13,250*
4020 diesel, 1968 (Good)	6350
4020 diesel, 1968 (Good)	6300
4020 diesel, 1968 (Good)	6100
4020 diesel, 1966 (Good)	5750
4020 diesel, 1965 (Good)	6200*
4010 diesel, 1963 (Good)	3575*
3020 diesel, 1965 (Good)	4600
3020 diesel, 1965 (Good)	4800*
2840 diesel, 1978 (Excellent)	10,300
2510 diesel, 1966 (Good)	4350
2030 diesel, 1973 (Excellent)	5100*
2020 diesel, 1967 (Good)	4100*
2020 diesel, 1967 (Good)	3800*
2020 diesel, 1967 (Excellent)	4500
2020 diesel, 1967 (Good)	4150
2020 diesel, 1967 (Good)	4000*
2020 diesel, 1967 (Good)	3900
2010 diesel, 1965 (Good)	1600*
2010 diesel, 1964 (Excellent)	2000
2010, ldr., 1961 (Fair)	975
1020, 1966 (Good)	3100
1010, 1963 (Good)	1600
1010, 1963 (Good)	1650
1010 diesel, 1961 (Fair)	1000
830 diesel, 1974 (Good)	3775
820 diesel, 1973 (Good)	3350
820, 1973 (Good)	3200
820 diesel, 1971 (Good)	3100
420, 1957 (Good)	1000
401-C, ldr., 1975 (Good)	6100
40, 1953 (Good)	700

LEYLAND TRACTORS

270 diesel, 1976 (Good)	2100
270 diesel, 1976 (Good)	2300

LONG TRACTORS

550 diesel, 1977 (Good)	3900
384 diesel, 1971 (Rough)	800*

MINNEAPOLIS-MOLINE TRACTORS

302, 1965 (Fair)	825
Jet Star 2, 1963 (Fair)	700

OLIVER TRACTORS

4-180 diesel, 1976 (Good)	8500*
1650 diesel, 1966 (Good)	2625
1600 diesel, 1963 (Fair)	800*
550 diesel, 1959 (Good)	1650*
55, 1955 (Good)	925
55 diesel, 1955 (Fair)	650

NOTES

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.
Prices reported are NOT averages.

Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

DEMONSTRATOR means—used for demonstrating only and in practically new condition.

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The Nebraska Tractor Test Law

. **Purpose of the Law**—The Nebraska Tractor Test Law originated in 1919 for the purpose of verifying advertising claims on tractors offered for sale to Nebraska farmers.

Its position as the only independent test laboratory in the United States devoted to the evaluation of tractor performance proved of unique value to the industry. The Agricultural Tractor Test Code used in the Nebraska Tests was developed with the approval and assistance of the American Society of Agricultural Engineers and the Society of Automotive Engineers, and is revised and updated periodically as the need arises. The Test Code (ASAE S209.4 or SAE J708c) is published in the ASAE Yearbook and SAE Handbook.

. **Provisions of the Law**—Stated briefly, the Nebraska Tractor Test Law provides:

That a stock unit of each agricultural tractor model sold in Nebraska shall be tested and passed upon by a board of three engineers under the supervision and direction of the University of Nebraska. Each tractor must be certified as a stock model and will be equipped with the common power consuming accessories. An official representative of the manufacturer is present during the test to see that the performance meets company standards.

The Department of Agriculture shall deny to any manufacturer the right to do business in the State on complaint of two or more bona fide customers that the company has failed to maintain an adequate service station with a full supply of replacement parts within the state and within reasonable distance of customers.

The law further states that it shall be unlawful to publish excerpts from any official test in advertising material without publishing the entire report.

The provisions of the Nebraska Test Law do not apply to any tractor the engine of which develops less than 20 hrosepower; or to tractors manufactured, sold and used for heavy construction when identical units are not sold and used for agricultural purposes.

Explanation of Test Report

Individual copies of any test report, annual summary booklets or annual subscription (at $3.50) are available. For complete information write to **Department of Agricultural Engineering, University of Nebraska—Lincoln, Lincoln, Nebraska 68583.**

GENERAL CONDITIONS

Each tractor tested is certified by the manufacturer to be a stock model. Tractor is equipped with all common power consuming accessories (power steering, lift pump, alternator, etc.) normally sold. Accessories may be disconnected only when the means for disconnecting can be reached from operator's station. Ballast can be added if recommended by the manufacturer and in amounts allowed under warranty policy. Static tire loads and inflation pressures must conform to standards established by the Tire & Rim Association.

PREPARATION FOR TESTS

The crankcase is drained and refilled with a weighed amount of new oil conforming to specifications in the operator's manual. The operator's manual is also used in selecting the proper fuel and for routine lubrication and maintenance operations. A time clock is installed to record total running time. A 12-hour run-in period under varying drawbar load is made on the test track under the direction of the manufacturer's representative. Preliminary adjustments can be made at this time. Parts added or removed under this or later runs are noted on the test report.

The tractor is equipped with approximately the amount of added ballast to be used during the drawbar test runs.

PTO PERFORMANCE

All PTO tests are made by connecting tractor PTO shaft to a dynamometer. During a preliminary power take-off run, the manufacturer's representative may make fuel, injection (ignition) timing and governor control settings. These settings must be maintained for remainder of tests. PTO test area is maintained at approximately 75°F. and tests are only run at 28.7 in. Hg or higher barometric pressure at test sight (1100 ft. altitude). Standard diesel fuel is heated to operating temperature characteristic of fuel system under test and maintained at that temperature. Fuel operating temperature is listed in "REMARKS" portion of each test.

Maximum Power and Fuel Consumption. Maximum power is tested for two hours at rated engine speed. Fuel consumption in gallons per hour, lbs per hp hour and hp-hr per gallon are noted and recorded. If standard PTO speed differs from rated engine speed a second (one hour) test run is made at PTO Rated Speed and the results recorded.

Varying Power and Fuel Consumption. Six 20-minute tests are made at (1) 85% of dynamometer torque at maximum power, (2) minimum dynamometer torque, (3) ½ of the 85% torque, (4) maximum power, (5) ¼ of the 85% torque and (6) ¾ of the 85% torque. This test is designed to approximate the varying load a tractor is subjected to during normal operation, and the fuel consumption figures given on the "Average" (Av) line closely indicate expected fuel use. Crankshaft speed variations also give some indication of governor performance.

DRAWBAR PERFORMANCE

Drawbar tests for pneumatic tires are performed on a concrete test course containing two 500-foot straight level areas and two 180 degree turns with a minimum radius of 50 feet. All engine adjustments are the same as those used in power take-off tests. Tire pressures are set at proper level, weights are added or removed and the tractor front, rear and total weight are taken and recorded.

Varying Power and Fuel Consumption. Maximum drawbar performance tests and varying power tests are made in the gear selected by the manufacturer. Slip of drive wheels must not exceed 15%, safe stability limits of the tractor must not be exceeded and 20% of static front end weight must remain on front wheels throughout the test.

The drawbar pull is set in four different test runs as follows: (1) Maximum power in selected gear; (2) 75% of pull at maximum power (10 hour test); (3) 50% of pull at maximum power; and (4) 50% of pull at reduced engine speed. In the final (50%) run, load and ground speed are maintained at levels set in previous run but transmission is shifted to a higher travel speed and crankshaft speed is reduced.

Maximum power in Selected Gears. In this run all forward gears are tested between 15% drive wheel slip and 10 miles per hour. This represents a minor change from earlier tests in which six manufacturer selected gears were tested, one of which could exceed 8 mph.

Lugging Ability in Rated Gear. The first run in this test is made at 100% maximum pull in the gear selected by the manufacturer. In each succeeding run, drawbar load is increased to reduce ground speed 10%, then drawbar pull, horsepower and drive wheel slip is recorded. The test ends when ground speed is reduced by 50% or when equipment limitations halt the test.

SOUND MEASUREMENT

Sound is recorded during each of the Varying Power drawbar tests, as the tractor travels on a straight section of the course. The dB(A) sound level is obtained by a microphone located near the right ear of the operator. Bystander sound readings are taken 25 feet from side of tractor during maximum throttle.

An increase of 10 dB(A) will approximately double the loudness to the human ear.

NEBRASKA TRACTOR TEST 1333 — BELARUS 1500 DIESEL (T-150K)
12 SPEED

POWER TAKE-OFF PERFORMANCE

Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption			Temperature °F *(°C)*			Barometer inch Hg *(kPa)*
		gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cooling medium	Air wet bulb	Air dry bulb	
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1024 rpm)								
168.76 *(125.84)*	2100	10.386 *(39.314)*	0.436 *(0.265)*	16.25 *(3.201)*	200 *(93.2)*	54 *(12.3)*	75 *(23.9)*	29.020 *(97.996)*
Standard Power Take-off Speed (1000 rpm)—One Hour								
169.63 *(126.49)*	2050	10.291 *(38.956)*	0.429 *(0.261)*	16.48 *(3.247)*	199 *(92.8)*	54 *(12.2)*	75 *(23.7)*	28.975 *(97.844)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
147.00 *(109.62)*	2153	9.202 *(34.832)*	0.443 *(0.270)*	15.98 *(3.147)*	192 *(88.6)*	54 *(12.2)*	75 *(23.9)*	....
0.00 *(0.00)*	2255	2.590 *(9.803)*	....	....	175 *(79.4)*	53 *(11.7)*	74 *(23.6)*	....
75.36 *(56.19)*	2207	5.811 *(21.997)*	0.546 *(0.332)*	12.97 *(2.555)*	183 *(83.9)*	54 *(12.2)*	75 *(23.9)*	....
169.57 *(126.45)*	2100	10.372 *(39.261)*	0.433 *(0.263)*	16.35 *(3.221)*	198 *(92.2)*	54 *(12.2)*	76 *(24.2)*	....
38.13 *(28.44)*	2233	4.090 *(15.483)*	0.759 *(0.462)*	9.32 *(1.837)*	178 *(81.4)*	54 *(11.9)*	75 *(23.9)*	....
111.77 *(83.35)*	2182	7.511 *(28.431)*	0.476 *(0.289)*	14.88 *(2.932)*	184 *(84.7)*	53 *(11.7)*	75 *(23.9)*	....
Av 90.30 *Av (67.34)*	**2188**	**6.596** *(24.968)*	**0.517** *(0.314)*	**13.69** *(2.697)*	**185** *(85.0)*	**54** *(12.0)*	**75** *(23.9)*	**28.953** *(97.771)*

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption			Temp. °F *(°C)*			Barom. inch Hg *(kPa)*
					gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cool-ing med	Air wet bulb	Air dry bulb	
Maximum Available Power—Two Hours 6th (2-2) Gear											
147.03 *(109.64)*	10381 *(46.18)*	5.31 *(8.55)*	2100	3.61	10.119 *(38.306)*	0.487 *(0.296)*	14.53 *(2.862)*	191 *(88.3)*	50 *(9.7)*	64 *(17.8)*	28.665 *(96.797)*
75% of Pull at Maximum Power—Ten Hours 6th (2-2) Gear											
118.73 *(88.53)*	8048 *(35.80)*	5.53 *(8.90)*	2170	2.77	8.491 *(32.142)*	0.506 *(0.308)*	13.98 *(2.754)*	184 *(84.4)*	44 *(6.9)*	56 *(13.2)*	28.929 *(97.689)*
50% of Pull at Maximum Power—Two Hours 6th (2-2) Gear											
80.89 *(60.32)*	5358 *(23.83)*	5.66 *(9.11)*	2207	2.19	6.605 *(25.003)*	0.578 *(0.352)*	12.25 *(2.412)*	181 *(82.8)*	39 *(3.6)*	40 *(4.2)*	29.075 *(98.182)*
50% of Pull at Reduced Engine Speed—Two Hours 8th (2-4) Gear											
80.99 *(60.39)*	5361 *(23.85)*	5.66 *(9.12)*	1409	2.25	5.651 *(21.393)*	0.494 *(0.300)*	14.33 *(2.823)*	176 *(80.0)*	41 *(4.7)*	42 *(5.3)*	29.025 *(98.013)*
MAXIMUM POWER IN SELECTED GEARS											
131.63 *(98.16)*	19311 *(85.90)*	2.56 *(4.11)*	2118	13.82		3rd (1-3) Gear		187 *(85.8)*	34 *(1.1)*	37 *(2.8)*	28.700 *(96.916)*
145.41 *(108.43)*	14799 *(65.83)*	3.68 *(5.93)*	2101	5.51		4th (1-4) Gear		195 *(90.3)*	51 *(10.6)*	70 *(21.1)*	28.690 *(96.882)*
151.93 *(113.30)*	12356 *(54.97)*	4.61 *(7.42)*	2100	4.15		5th (2-1) Gear		195 *(90.3)*	51 *(10.6)*	69 *(20.6)*	28.700 *(96.916)*
151.96 *(113.31)*	10728 *(47.72)*	5.31 *(8.55)*	2100	3.51		6th (2-2) Gear		195 *(90.6)*	51 *(10.6)*	70 *(21.1)*	28.710 *(96.949)*
150.88 *(112.51)*	8951 *(39.81)*	6.32 *(10.17)*	2100	2.94		7th (2-3) Gear		195 *(90.6)*	51 *(10.6)*	70 *(21.1)*	28.690 *(96.882)*
149.24 *(111.29)*	6628 *(29.48)*	8.44 *(13.59)*	2100	2.22		8th (2-4) Gear		192 *(88.9)*	51 *(10.6)*	70 *(21.1)*	28.680 *(96.848)*

Department of Agricultural Engineering

Dates of Test: November 14-27, 1979

Manufacturer: KHARKOV TRACTOR PLANT, Kharkov - 7 USSR

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 49.0 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°60°** *(15°/15°)* 0.8500 **Fuel weight** 7.078 lbs/gal *(0.848 kg/l)* **Oil SAE** 30 **API service classification** SB-SE/CA-CD **To motor** 4.849 gal *(18.353 l)* **Drained from motor** 3.941 gal *(14.917 l)* **Transmission and hydraulic lubricant** SAE 30 **Final drive lubricant** SAE 90 **Total time engine was operated** 41.0 hours.

ENGINE: Make USSR Diesel **Type** six cylinder vee with turbocharger **Model** SMD-62 **Serial No.** 79255514 **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 5.118" x 4.528" *(130 mm x 115 mm)* **Compression ratio** 15.0 to 1 **Displacement** 558 cu in *(9150 ml)* **Starting system** single cylinder, 2 cycle gasoline engine started by 12 volt motor or hand rope **Lubrication** pressure **Air cleaner** steel wool element with aspirator **Air compressor** direct engine drive **Oil filter** full flow centrifugal, separate washable element for turbocharger **Oil cooler** separate radiators for crankcase and transmission oil **Fuel filter** three paper elements in parallel, sediment bowl and strainer **Muffler** vertical **Cooling medium temperature control** two thermostats.

CHASSIS: Type Four-wheel drive **Serial No.** 128543 **Tread width** rear 73.2" *(1860 mm)* front 73.2" *(1860 mm)* **Wheel base** 112.6" *(2860 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 72.4" *(1839 mm)* Vertical distance above roadway 37.2" *(945 mm)* Horizontal distance from center of rear wheel tread 0.4" *(10 mm)* to the left **Hydraulic control system** direct engine drive with throw out lever (engaged during test) **Transmission** selective gear fixed ratio with partial (4) range operator controlled powershift **Advertised speeds mph *(km/h)*** first 2.1 *(3.4)* second 2.4 *(3.8)* third 2.8 *(4.6)* fourth 3.8 *(6.0)* fifth 4.6 *(7.4)* sixth 5.3 *(8.5)* seventh 6.3 *(10.1)* eighth 8.3 *(13.4)* ninth 10.1 *(16.2)* tenth 11.6 *(18.6)* eleventh 13.7 *(22.0)* twelfth 18.7 *(30.0)* **reverse** 3.8 *(6.1)*, 4.4 *(7.0)*, 5.2 *(8.3)*, 6.9 *(11.1)* **Clutch** double dry disc, air power assisted, operated by foot pedal **Brakes** expanding shoe pneumatically operated by foot pedal **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 263.7" *(6.70 m)* left 263.7" *(6.70 m)* **Turning space diameter** (on concrete surface without brake) right 562" *(14.27 m)* left 562" *(14.27 m)* **Power take-off** 1000 rpm at 2050 engine rpm.

LUGGING ABILITY IN 6th (2-2) GEAR

Crankshaft Speed rpm	2100	1893	1676	1464	1256	1052
Pull—lbs ***(kN)***	10728 *(47.72)*	11531 *(51.29)*	12686 *(56.43)*	13511 *(60.10)*	12416 *(55.23)*	10950 *(48.71)*
Increase in Pull %	0	7	18	26	16	2
Power—Hp ***(kW)***	151.96 *(113.31)*	146.71 *(109.40)*	142.31 *(106.12)*	131.80 *(98.28)*	104.49 *(77.91)*	77.57 *(57.84)*
Speed—Mph ***(km/h)***	5.31 *(8.55)*	4.77 *(7.68)*	4.21 *(6.77)*	3.66 *(5.89)*	3.16 *(5.08)*	2.66 *(4.28)*
Slip %	3.51	3.89	4.40	4.65	4.40	3.64

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	87.0
75% of Pull at Maximum Power—Ten Hours	86.5
50% of Pull at Maximum Power—Two Hours	86.5
50% of Pull at Reduced Engine Speed—Two Hours	83.5
Bystander in 12th (3-4) gear	94.5

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 530-610/21.3-24P, 10, 18 *(125)*	Two 530-610/21.3-24P, 10, 18 *(125)*
Ballast	—Liquid (each)	560 lb *(254 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPc)*	Two 530-610/21.3-24P, 10, 26 *(180)*	Two 530-610/21.3-24P, 10, 26 *(180)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	None	None
Height of Drawbar		15.5 in *(395 mm)*	15.5 in *(395 mm)*
Static Weight with Operator	—Rear	7955 lb *(3608 kg)*	6835 lb *(3100 kg)*
	—Front	11930 lb *(5411 kg)*	11930 lb *(5411 kg)*
	—Total	19885 lb *(9019 kg)*	18765 lb *(8511 kg)*

REPAIRS and ADJUSTMENTS: Previous to the Ten Hour Drawbar Test, cab insulation had to be removed from under the throttle linkage.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 151°F *(66.2°C)*. Six gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The pull in 3rd (1-3) was limited to avoid tractor bouncing.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1333.**

L. I. LEVITICUS
Engineer-in-Charge

G. W. STEINBRUEGGE
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

Belarus
1500

Belarus 1500 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
H. W. Ottoson, Director

NEBRASKA TRACTOR TEST 1334 — BELARUS 7100 DIESEL (K-701) 16 SPEED

POWER TAKE-OFF PERFORMANCE

Power Hp (*kW*)	Crank shaft speed rpm	Fuel Consumption gal/hr (*l/h*)	lb/hp.hr (*kg/kW.h*)	Hp.hr/gal (*kW.h/l*)	Temperature °F (°C) Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg (*kPa*)
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1003 rpm)								
269.62 *(201.05)*	1900	17.010 *(64.392)*	0.447 *(0.272)*	15.85 *(3.122)*	182 *(83.1)*	54 *(12.1)*	75 *(23.9)*	29.010 *(97.962)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
236.57 *(176.41)*	1962	15.097 *(57.150)*	0.452 *(0.275)*	15.67 *(3.087)*	170 *(76.9)*	54 *(12.5)*	76 *(24.2)*	....
0.00 *(0.00)*	2102	4.849 *(18.355)*	....	....	173 *(78.3)*	55 *(12.8)*	76 *(24.7)*	....
122.29 *(91.19)*	2028	9.486 *(35.907)*	0.549 *(0.334)*	12.89 *(2.540)*	172 *(77.8)*	56 *(13.1)*	76 *(24.4)*	....
271.53 *(202.48)*	1900	17.001 *(64.354)*	0.443 *(0.270)*	15.97 *(3.146)*	182 *(83.1)*	54 *(12.2)*	74 *(23.6)*	....
62.54 *(46.64)*	2074	7.265 *(27.500)*	0.822 *(0.500)*	8.61 *(1.696)*	168 *(75.6)*	54 *(12.2)*	76 *(24.2)*	....
181.03 *(134.99)*	2002	12.190 *(46.144)*	0.477 *(0.290)*	14.85 *(2.925)*	172 *(77.5)*	54 *(12.2)*	74 *(23.6)*	....
Av 145.66 ***Av (108.62)***	**2011**	**10.981** ***(41.568)***	**0.534** ***(0.325)***	**13.26** ***(2.613)***	**173** ***(78.2)***	**54** ***(12.5)***	**75** ***(24.1)***	....

DRAWBAR PERFORMANCE

Power Hp (*kW*)	Drawbar pull lbs (*kN*)	Speed mph (*km/h*)	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr (*l/h*)	lb/hp.hr (*kg/kW.h*)	Hp.hr/gal (*kW.h/l*)	Temp. °F (°C) Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg (*kPa*)
Maximum Available Power—Two Hours 8th (R3-P2) Gear											
249.69 *(186.20)*	15973 *(71.05)*	5.86 *(9.43)*	1899	3.87	16.848 *(63.777)*	0.478 *(0.291)*	14.82 *(2.920)*	175 *(79.4)*	35 *(1.4)*	42 *(5.3)*	29.010 *(97.962)*
75% of Pull at Maximum Power—Ten Hours 8th (R3-P2) Gear											
206.41 *(153.92)*	12401 *(55.16)*	6.24 *(10.04)*	2009	3.14	14.383 *(54.444)*	0.493 *(0.300)*	14.35 *(2.827)*	170 *(76.6)*	22 *(−5.6)*	23 *(−5.0)*	29.219 *(98.668)*
50% of Pull at Maximum Power—Two Hours 8th (R3-P2) Gear											
136.90 *(102.09)*	7995 *(35.56)*	6.42 *(10.33)*	2043	1.91	10.896 *(41.247)*	0.563 *(0.343)*	12.56 *(2.475)*	177 *(80.6)*	31 *(−0.5)*	34 *(0.8)*	28.940 *(97.726)*
50% of Pull at Reduced Engine Speed—Two Hours 12th (R3-P4) Gear											
137.68 *(102.67)*	8026 *(35.70)*	6.43 *(10.35)*	1409	1.95	9.042 *(34.228)*	0.465 *(0.283)*	15.23 *(3.000)*	178 *(81.1)*	35 *(1.4)*	40 *(4.4)*	28.980 *(97.861)*
MAXIMUM POWER IN SELECTED GEARS											
201.41 *(150.19)*	30845 *(137.21)*	2.45 *(3.94)*	1971	12.85	3rd (R1-P3) Gear			181 *(82.5)*	32 *(0.0)*	38 *(3.3)*	29.080 *(98.199)*
234.31 *(174.73)*	30139 *(134.07)*	2.92 *(4.69)*	1900	10.53	4th (R1-P4) Gear			177 *(80.3)*	33 *(0.6)*	39 *(3.9)*	29.080 *(98.199)*
259.15 *(193.25)*	22784 *(101.35)*	4.27 *(6.86)*	1899	5.57	5th (R2-P1) Gear			180 *(82.2)*	37 *(2.8)*	43 *(6.1)*	28.700 *(96.916)*
259.46 *(193.48)*	20367 *(90.60)*	4.78 *(7.69)*	1899	4.88	6th (R3-P1) Gear			171 *(77.2)*	37 *(2.8)*	43 *(6.1)*	28.690 *(96.882)*
252.73 *(188.46)*	18046 *(80.27)*	5.25 *(8.45)*	1896	4.19	7th (R2-P2) Gear			178 *(81.1)*	37 *(2.8)*	44 *(6.7)*	28.680 *(96.848)*
258.60 *(192.84)*	16523 *(73.50)*	5.87 *(9.45)*	1900	3.64	8th (R3-P2) Gear			172 *(77.5)*	35 *(1.7)*	42 *(5.6)*	29.000 *(97.929)*
252.74 *(188.47)*	14819 *(65.92)*	6.40 *(10.29)*	1899	3.24	9th (R2-P3) Gear			174 *(78.9)*	37 *(2.8)*	43 *(6.1)*	28.700 *(96.916)*
256.98 *(191.63)*	13521 *(60.15)*	7.13 *(11.47)*	1900	2.92	10th (R3-P3) Gear			174 *(78.9)*	37 *(2.8)*	43 *(6.1)*	28.700 *(96.916)*
258.99 *(193.13)*	12542 *(55.79)*	7.74 *(12.46)*	1900	2.76	11th (R2-P4) Gear			174 *(78.9)*	37 *(2.8)*	43 *(6.1)*	28.700 *(96.916)*
259.36 *(193.41)*	11292 *(50.23)*	8.61 *(13.86)*	1898	2.52	12th (R3-P4) Gear			180 *(81.9)*	37 *(2.8)*	43 *(6.1)*	28.700 *(96.916)*

Department of Agricultural Engineering

Dates of Test: November 17-30, 1979

Manufacturer: KIROV PLANT, Leningrad, USSR

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 49.0 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8500 **Fuel weight** 7.078 lbs/gal *(0.848 kg/l)* **Oil SAE 30 API service classification** SB-SE/CA-CD **To motor** 9.518 gal *(36.029 l)* **Drained from motor** 8.216 gal *(31.100 l)* **Transmission and final drive lubricant** SAE 30 **Total time engine was operated** 40.5 hours

ENGINE: Make YAMZ Diesel **Type** twelve cylinder vee **Serial No.** 73193 **Crankshaft** lengthwise **Rated rpm** 1900 **Bore and stroke** 5.118" × 5.512" *(130 mm × 140 mm)* **Compression ratio** 16.5 to 1 **Displacement** 1360 cu in *(22300 ml)* **Starting system** 24 volt **Lubrication** pressure **Air cleaner** four paper elements in parallel with aspirator **Air compressor** direct engine drive **Oil filter** two fiber elements **Oil cooler** separate radiators for crankcase and transmission oil **Fuel filter** two steel mesh primary elements and two paper secondary elements **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** thermo-hydraulic fan.

CHASSIS: Type Four wheel drive **Serial No.** 705472 **Tread width** rear 83.3" *(2115 mm)* front 83.3" *(2115 mm)* **Wheel base** 126" *(3200 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 85.0" *(2160 mm)* Vertical distance above roadway 43.3" *(1100 mm)* Horizontal distance from center of rear wheel tread 0.4" *(10 mm)* to the left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (4) range operator controlled powershift **Advertised speeds mph** ***(km/h)*** first 1.8 *(2.9)* second 2.2 *(3.5)* third 2.6 *(4.2)* fourth 3.2 *(5.1)* fifth 4.4 *(7.1)* sixth 4.8 *(7.8)* seventh 5.3 *(8.6)* eighth 5.9 *(9.5)* ninth 6.4 *(10.3)* tenth 7.1 *(11.5)* eleventh 7.7 *(12.4)* twelfth 8.6 *(13.8)* thirteenth 11.9 *(19.2)* fourteenth 14.5 *(23.3)* fifteenth 17.4 *(28.0)* sixteenth 21.0 *(33.8)* reverse 3.2 *(5.1)*, 3.9 *(6.2)*, 4.6 *(7.4)*, 5.5 *(8.9)*, 8.6 *(13.8)*, 10.4 *(16.7)*, 12.6 *(20.2)*, 15.1 *(24.3)* **Clutch** multiple wet disc hydraulically operated by foot pedal **Brakes** expanding shoe pneumatically operated by foot pedal **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake applied) right 283" *(7.18 m)* left 283" *(7.18 m)* **Turning space diameter** (on concrete surface without brake applied) right 598" *(15.19 m)* left 598" *(15.19 m)* **Power take-off** 1003 rpm at 1900 engine rpm.

LUGGING ABILITY IN 8th (R3-P2) GEAR

Crankshaft Speed rpm	1900	1711	1517	1327	1134	947
Pull—lbs *(kN)*	16523 *(73.50)*	17514 *(77.91)*	18624 *(82.84)*	18704 *(83.20)*	17559 *(78.11)*	16029 *(71.30)*
Increase in Pull %	0	6	13	13	6	−3
Power—Hp *(kW)*	258.60 *(192.84)*	246.29 *(183.66)*	231.52 *(172.65)*	203.25 *(151.56)*	163.58 *(121.98)*	125.11 *(93.30)*
Speed—Mph *(km/h)*	5.87 *(9.45)*	5.27 *(8.49)*	4.66 *(7.50)*	4.07 *(6.56)*	3.49 *(5.62)*	2.93 *(4.71)*
Slip %	3.64	3.95	4.26	4.26	3.95	3.79

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	90.5
75% of Pull at Maximum Power—Ten Hours	90.0
50% of Pull at Maximum Power—Two Hours	91.0
50% of Pull at Reduced Engine Speed—Two Hours	88.0
Bystander in 15th (R4-P3) gear	94.0

TIRES, BALLAST AND WEIGHT		Tested Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 720-665/28.1-26P 12; 18 *(125)*
Ballast	—Liquid (each)	None
	—Cast Iron (each)	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 720-665/28.1-26P 12; 24 *(165)*
Ballast	—Liquid (each)	None
	—Cast Iron (each)	None
Height of Drawbar		22 in *(560 mm)*
Static Weight with Operator	—Rear	11260 lb *(5108 kg)*
	Front	21200 lb *(9616 kg)*
	Total	32460 lb *(14724 kg)*

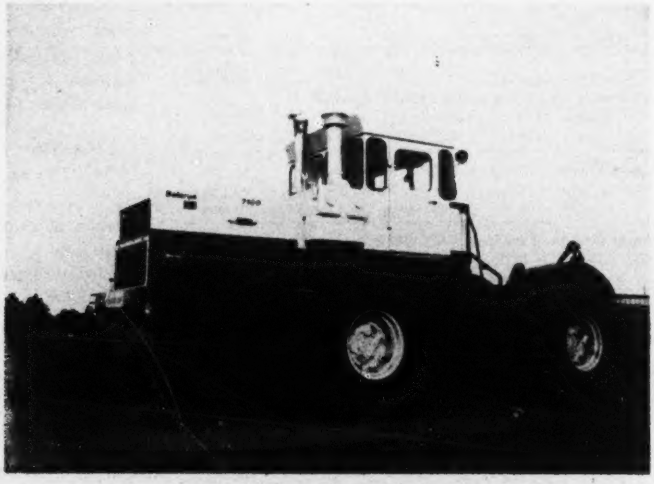
REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump return was 139°F *(59.3°C)*. Ten gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The pull in 3rd (R1-P3) gear was limited to avoid tractor bouncing. The PTO reduction case had to be cooled with a fan in order to prevent overheating. Variations in the Drawbar Test Data can be attributed to cycling of the cooling fan.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1334.**

LOUIS I. LEVITICUS
Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers



Belarus 7100 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
H. W. Ottoson, Director

NEBRASKA TRACTOR TEST 1335 — VERSATILE 895 DIESEL 12 SPEED

DRAWBAR PERFORMANCE AT 2100 RPM

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 7th (2-3) Gear											
251.51 *(187.55)*	14609 *(64.98)*	6.46 *(10.39)*	2099	3.35	16.603 *(62.849)*	0.466 *(0.284)*	15.15 *(2.984)*	176 *(79.7)*	43 *(6.1)*	50 *(9.7)*	28.890 *(97.557)*
75% of Pull at Maximum Power—Ten Hours 7th (2-3) Gear											
212.55 *(158.49)*	11404 *(50.73)*	6.99 *(11.25)*	2257	2.58	15.488 *(58.628)*	0.515 *(0.313)*	13.72 *(2.702)*	171 *(77.1)*	42 *(5.3)*	44 *(6.4)*	28.663 *(96.791)*
50% of Pull at Maximum Power—Two Hours 7th (2-3) Gear											
147.20 *(109.77)*	7618 *(33.89)*	7.25 *(11.66)*	2323	1.83	12.727 *(48.175)*	0.611 *(0.371)*	11.57 *(2.279)*	174 *(78.6)*	43 *(5.8)*	44 *(6.4)*	28.840 *(97.388)*
50% of Pull at Reduced Engine Speed—Two Hours 10th (3-2) Gear											
147.00 *(109.62)*	7619 *(33.89)*	7.24 *(11.64)*	1372	1.79	9.434 *(35.713)*	0.453 *(0.276)*	15.58 *(3.070)*	176 *(79.7)*	36 *(2.2)*	37 *(2.8)*	28.610 *(96.612)*
MAXIMUM POWER IN SELECTED GEARS											
218.72 *(163.10)*	29402 *(130.79)*	2.79 *(4.49)*	2151	14.76		2nd (1-2) Gear		174 *(78.6)*	40 *(4.4)*	41 *(5.0)*	28.990 *(97.895)*
241.13 *(179.81)*	27572 *(122.65)*	3.28 *(5.28)*	2099	10.80		3rd (1-3) Gear		177 *(80.6)*	44 *(6.7)*	55 *(12.8)*	28.820 *(97.321)*
255.98 *(190.89)*	23999 *(106.75)*	4.00 *(6.44)*	2100	6.38		4th (1-4) Gear		177 *(80.3)*	44 *(6.7)*	55 *(12.8)*	28.830 *(97.355)*
259.34 *(193.39)*	20478 *(91.09)*	4.75 *(7.64)*	2101	4.91		5th (2-1) Gear		177 *(80.3)*	44 *(6.7)*	55 *(12.8)*	28.830 *(97.355)*
261.42 *(194.94)*	17603 *(78.30)*	5.57 *(8.96)*	2100	3.96		6th (2-2) Gear		178 *(80.8)*	44 *(6.7)*	54 *(12.2)*	28.840 *(97.388)*
261.63 *(195.09)*	15200 *(67.61)*	6.45 *(10.39)*	2099	3.31		7th (2-3) Gear		177 *(80.3)*	44 *(6.7)*	53 *(11.7)*	28.850 *(97.422)*
259.62 *(193.60)*	12921 *(57.47)*	7.53 *(12.13)*	2101	2.82		8th (2-4) Gear		177 *(80.6)*	44 *(6.7)*	55 *(12.8)*	28.810 *(97.287)*
256.22 *(191.06)*	10113 *(44.98)*	9.50 *(15.29)*	2099	2.08		9th (3-1) Gear		176 *(80.0)*	44 *(6.7)*	55 *(12.8)*	28.800 *(97.253)*

LUGGING ABILITY IN 7th (2-3) GEAR

Crankshaft Speed rpm	2099	1892	1678	1470	1257	1053
Pull—lbs *(kN)*	15200 *(67.61)*	17016 *(75.69)*	18920 *(84.16)*	20412 *(90.80)*	20270 *(90.16)*	18013 *(80.13)*
Increase in Pull %	0	12	24	34	33	19
Power—Hp *(kW)*	261.63 *(195.09)*	262.66 *(195.86)*	257.41 *(191.95)*	241.93 *(180.41)*	205.66 *(153.36)*	154.04 *(114.87)*
Speed—Mph *(km/h)*	6.45 *(10.39)*	5.79 *(9.32)*	5.10 *(8.21)*	4.44 *(7.15)*	3.80 *(6.12)*	3.21 *(5.16)*
Slip %	3.31	3.88	4.36	4.99	4.83	4.20

TRACTOR SOUND LEVEL WITH CAB	**2100 RPM dB(A)**	**1900 RPM dB(A)**	**1750 RPM dB(A)**
Maximum Available Power—Two Hours	83.5	83.5	82.0
75% of Pull at Maximum Power—Ten Hours	84.0	---	---
50% of Pull at Maximum Power—Two Hours	83.0	---	---
50% of Pull at Reduced Engine Speed—Two Hours	81.5	---	---
Bystander in 12th (3-4) gear	91.0	---	---

Department of Agricultural Engineering

Dates of Test: March 25 to April 3, 1980

Manufacturer: VERSATILE MANUFACTURING CO., 1260 Clarence Avenue, Winnipeg, Manitoba R3T 1T3

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 30 **API service classification** SB/SE-CA/CD **To motor** 7.024 gal *(26.586 l)* **Drained from motor** 6.020 gal *(22.786 l)* **Transmission and hydraulic lubricant** Esso Hydraul 56 or equivalent **Final drive lubricant** SAE 90 **Total time engine was operated** 54.0 hours.

ENGINE: Make Cummins Diesel **Type** six cylinder vertical with turbocharger and intercooler **Serial No.** 10894686 **Crankshaft** lengthwise **Rated rpm** 1750 to 2100 **Bore and stroke** 5.5" x 6.0" *(139.7 mm x 152.4 mm)* **Compression ratio** 14.1 to 1 **Displacement** 855 cu in *(14013 ml)* **Starting System** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two cartridges **Muffler** vertical **Cooling medium temperature control** one thermostat.

CHASSIS: Type Four-wheel drive with duals **Serial No.** 895 80 090029 **Tread width** rear 72" *(1829 mm)* to 129" *(3276 mm)* front 72" *(1829 mm)* to 129" *(3276 mm)* **Wheel base** 130" *(3302 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 84.0" *(2134 mm)* Vertical distance above roadway 42.0" *(1067 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 2.6 *(4.2)* second 3.0 *(4.9)* third 3.5 *(5.6)* fourth 4.1 *(6.6)* fifth 4.7 *(7.6)* sixth 5.5 *(8.9)* seventh 6.3 *(10.2)* eighth 7.3 *(11.8)* ninth 9.2 *(14.8)* tenth 10.7 *(17.2)* eleventh 12.3 *(19.8)* twelfth 14.3 *(23.0)* reverse 3.4 *(5.4)*, 3.9 *(6.3)*, 4.5 *(7.3)*, 5.2 *(8.4)* **Clutch** two dry discs operated by foot pedal **Brakes** dual caliper disc hydraulically operated by foot pedal or mechanically by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 239" *(6.07 m)* left 239" *(6.07 m)* **Turning space diameter** (on concrete surface without brake) right 490" *(12.45 m)* left 490" *(12.45 m)* **Power take-off** none.

DRAWBAR PERFORMANCE AT 1900 RPM

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank-shaft speed rpm	Slip %	Fuel Consumption			Temp. °F (°C)			Barom. inch Hg (kPa)
					gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Cool-ing med	Air wet bulb	Air dry bulb	
Maximum Available Power—Two Hours 7th (2-3) Gear											
255.07 *(190.21)*	16462 *(73.23)*	5.81 *(9.35)*	1900	3.72	15.895 *(60.169)*	0.440 *(0.268)*	16.05 *(3.161)*	176 *(80.0)*	42 *(5.3)*	44 *(6.7)*	28.905 *(97.608)*

MAXIMUM POWER IN SELECTED GEARS

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank-shaft speed rpm	Slip %	Gear	Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg (kPa)
228.00 *(170.02)*	29413 *(130.83)*	2.91 *(4.68)*	1953	14.95	3rd (1-3) Gear	175 *(79.4)*	40 *(4.4)*	41 *(5.0)*	28.990 *(97.895)*
248.47 *(185.29)*	26453 *(117.67)*	3.52 *(5.67)*	1899	8.90	4th (1-4) Gear	178 *(81.1)*	44 *(6.7)*	55 *(12.8)*	28.820 *(97.321)*
259.20 *(193.28)*	22859 *(101.68)*	4.25 *(6.84)*	1900	5.84	5th (2-1) Gear	178 *(81.1)*	44 *(6.7)*	55 *(12.8)*	28.830 *(97.355)*
261.89 *(195.29)*	19610 *(87.23)*	5.01 *(8.06)*	1901	4.44	6th (2-2) Gear	178 *(81.1)*	44 *(6.7)*	54 *(12.2)*	28.840 *(97.388)*
263.21 *(196.28)*	16998 *(75.61)*	5.81 *(9.35)*	1899	3.88	7th (2-3) Gear	177 *(80.3)*	44 *(6.7)*	54 *(12.2)*	28.840 *(97.388)*
263.33 *(196.37)*	14548 *(64.71)*	6.79 *(10.92)*	1900	3.15	8th (2-4) Gear	177 *(80.6)*	44 *(6.7)*	55 *(12.8)*	28.810 *(97.287)*
261.69 *(195.14)*	11442 *(50.89)*	8.58 *(13.80)*	1900	2.41	9th (3-1) Gear	177 *(80.3)*	44 *(6.7)*	55 *(12.8)*	28.800 *(97.253)*

DRAWBAR PERFORMANCE AT 1750 RPM

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank-shaft speed rpm	Slip %	gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg (kPa)
Maximum Available Power—Two Hours 7th (2-3) Gear											
253.68 *(189.17)*	17833 *(79.32)*	5.33 *(8.59)*	1750	4.20	15.311 *(57.958)*	0.426 *(0.259)*	16.57 *(3.264)*	173 *(78.3)*	42 *(5.6)*	45 *(7.2)*	28.890 *(97.557)*

MAXIMUM POWER IN SELECTED GEARS

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank-shaft speed rpm	Slip %	Gear	Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg (kPa)
258.77 *(192.96)*	18193 *(80.92)*	5.33 *(8.58)*	1750	4.12	7th (2-3) Gear	173 *(78.3)*	42 *(5.6)*	45 *(7.2)*	28.930 *(97.692)*

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	--No., size, ply & psi *(kPa)*	Four 24.5-32; 10; inner 16 *(110)*; outer 14 *(95)*	Four 24.5-32; 10; inner 16 *(110)*; outer 14 *(95)*
Ballast	—Liquid (each inner)	1755 lb *(796 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Four 24.5-32; 10; inner 16 *(110)*; outer 14 *(95)*	Four 24.5-32; 10; inner 16 *(110)*; outer 14 *(95)*
Ballast	—Liquid (each inner)	2185 lb *(991 kg)*	None
	—Cast Iron (each)	None	None
Height of Drawbar		19 in *(485 mm)*	19 in *(485 mm)*
Static Weight with Operator—Rear		13070 lb *(5929 kg)*	9560 lb *(4336 kg)*
Front		19430 lb *(8813 kg)*	15060 lb *(6831 kg)*
Total		32500 lb *(14742 kg)*	24620 lb *(11167 kg)*

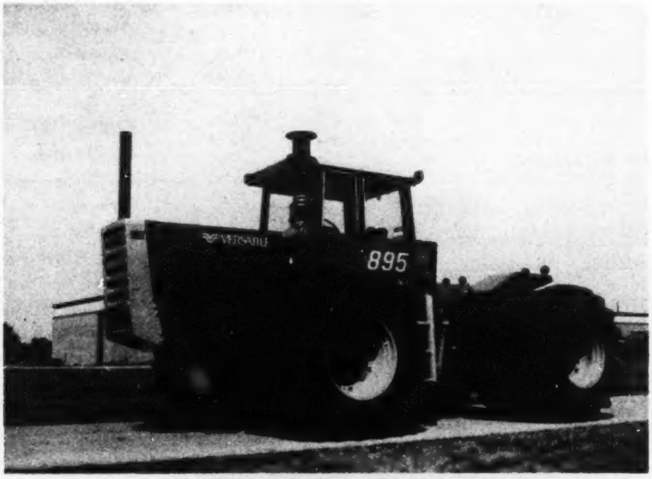
REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 120°F *(48.9°C)*. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1335.**

L. I. LEVITICUS
Engineer-in-Charge

G. W. STEINBRUEGGE
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers



Versatile 895 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1336 — INTERNATIONAL 686 DIESEL 10 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Temperature °F *(°C)* Air wet bulb	Temperature °F *(°C)* Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—543 rpm)									
	66.36 *(49.49)*	2000	4.131 *(15.636)*	0.440 *(0.267)*	16.07 *(3.165)*	193 *(89.7)*	58 *(14.5)*	75 *(23.9)*	28.733 *(97.028)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	59.91 *(44.68)*	2124	3.806 *(14.408)*	0.449 *(0.273)*	15.74 *(3.101)*	190 *(87.8)*	58 *(14.2)*	74 *(23.6)*	....
	0.00 *(0.00)*	2198	1.236 *(4.680)*	....	....	180 *(82.5)*	58 *(14.4)*	75 *(23.9)*	....
	30.62 *(22.83)*	2171	2.447 *(9.263)*	0.564 *(0.343)*	12.51 *(2.465)*	186 *(85.3)*	58 *(14.4)*	75 *(23.9)*	....
	66.49 *(49.58)*	2000	4.142 *(15.679)*	0.440 *(0.268)*	16.05 *(3.162)*	194 *(90.0)*	58 *(14.4)*	75 *(23.9)*	....
	15.46 *(11.53)*	2191	1.827 *(6.915)*	0.834 *(0.507)*	8.47 *(1.668)*	182 *(83.3)*	58 *(14.4)*	75 *(23.9)*	....
	45.47 *(33.91)*	2150	3.101 *(11.739)*	0.482 *(0.293)*	14.66 *(2.889)*	187 *(86.1)*	58 *(14.4)*	75 *(23.9)*	....
Av ***Av***	**36.33** ***(27.09)***	**2139**	**2.760** ***(10.447)***	**0.537** ***(0.326)***	**13.16** ***(2.593)***	**186** ***(85.8)***	**58** ***(14.4)***	**75** ***(23.8)***	**28.737** ***(97.039)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 7th (3 DD) Gear											
57.71 *(43.03)*	4266 *(18.97)*	5.07 *(8.16)*	2000	5.85	4.142 *(15.679)*	0.507 *(0.308)*	13.93 *(2.745)*	185 *(85.0)*	44 *(6.7)*	54 *(11.9)*	29.050 *(98.097)*
75% of Pull at Maximum Power—Ten Hours 7th (3 DD) Gear											
47.60 *(35.50)*	3255 *(14.48)*	5.48 *(8.83)*	2124	4.20	3.586 *(13.575)*	0.532 *(0.324)*	13.27 *(2.615)*	185 *(84.9)*	48 *(9.1)*	62 *(16.8)*	28.555 *(96.426)*
50% of Pull at Maximum Power—Two Hours 7th (3 DD) Gear											
32.66 *(24.36)*	2180 *(9.70)*	5.62 *(9.04)*	2148	2.99	2.832 *(10.721)*	0.612 *(0.372)*	11.53 *(2.272)*	182 *(83.1)*	46 *(7.5)*	57 *(13.6)*	29.020 *(97.996)*
50% of Pull at Reduced Engine Speed—Two Hours 8th (4 DD) Gear											
32.41 *(24.17)*	2160 *(9.61)*	5.63 *(9.05)*	1519	2.77	2.478 *(9.380)*	0.540 *(0.328)*	13.08 *(2.576)*	183 *(83.6)*	39 *(3.9)*	44 *(6.4)*	28.775 *(97.169)*
MAXIMUM POWER IN SELECTED GEARS											
52.18 *(38.91)*	8043 *(35.78)*	2.43 *(3.92)*	2119	14.87	2nd (1 DD) Gear			186 *(85.6)*	49 *(9.4)*	65 *(18.3)*	28.580 *(96.510)*
53.08 *(39.58)*	7667 *(34.11)*	2.60 *(4.18)*	2000	12.66	3rd (2 TA) Gear			187 *(86.1)*	49 *(9.4)*	65 *(18.3)*	28.580 *(96.510)*
55.78 *(41.60)*	6362 *(28.30)*	3.29 *(5.29)*	1999	9.58	4th (3 TA) Gear			187 *(85.8)*	43 *(6.1)*	51 *(10.6)*	29.070 *(98.165)*
58.19 *(43.39)*	5352 *(23.81)*	4.08 *(6.56)*	2001	7.55	5th (2 DD) Gear			186 *(85.3)*	42 *(5.6)*	49 *(9.4)*	29.080 *(98.199)*
57.21 *(42.66)*	4430 *(19.70)*	4.84 *(7.79)*	2001	5.85	6th (4 TA) Gear			186 *(85.6)*	42 *(5.6)*	48 *(8.9)*	29.080 *(98.199)*
58.81 *(43.85)*	4339 *(19.30)*	5.08 *(8.18)*	2000	5.71	7th (3 DD) Gear			185 *(85.0)*	42 *(5.6)*	47 *(8.3)*	29.070 *(98.165)*
58.44 *(43.58)*	2994 *(13.32)*	7.32 *(11.78)*	2000	3.94	8th (4 DD) Gear			187 *(85.8)*	43 *(6.1)*	52 *(11.1)*	29.070 *(98.165)*

LUGGING ABILITY IN 7th (3 DD) GEAR

Crankshaft Speed rpm	2000	1799	1598	1399	1203	996
Pull—lbs *(kN)*	4339 *(19.30)*	4605 *(20.48)*	4845 *(21.55)*	4982 *(22.16)*	4628 *(20.59)*	4608 *(20.50)*
Increase in Pull %	0	6	12	15	7	6
Power—Hp *(kW)*	58.81 *(43.85)*	55.81 *(41.61)*	51.98 *(38.76)*	46.68 *(34.81)*	37.50 *(27.97)*	30.78 *(22.95)*
Speed—Mph *(km/h)*	5.08 *(8.18)*	4.54 *(7.31)*	4.02 *(6.47)*	3.51 *(5.65)*	3.04 *(4.89)*	2.50 *(4.03)*
Slip %	5.71	6.26	6.53	6.81	6.26	6.26

Department of Agricultural Engineering

Dates of Test: March 26 to April 16, 1980

Manufacturer: INTERNATIONAL HARVESTER CO., 401 North Michigan Avenue, Chicago, Illinois 60611

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 30 **API service classification** CA/CD-SC/SE **To motor** 2.844 gal *(10.765 l)* **Drained from motor** 2.650 gal *(10.030 l)* **Transmission and final drive lubricant** I.H. Hy-Tran Fluid **Total time engine was operated** 37.5 hours.

ENGINE Make International Diesel **Type** 6 cylinder vertical **Serial No.** 310DT2D080258* **Crankshaft** lengthwise **Rated rpm** 2000 **Bore and stroke** 3.875" × 4.375" *(98.4 mm × 111.1 mm)* **Compression ratio** 15.1 to 1 **Displacement** 310 cu in *(5080 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element **Oil filter** one full flow paper cartridge **Oil cooler** radiator for hydraulic and transmission oil **Fuel filter** two paper elements **Muffler** vertical **Cooling medium temperature control** one thermostat

CHASSIS: Type standard **Serial No.** 2450176U011253* **Tread width** rear 50" *(1270 mm)* to 96" *(2438 mm)* front 56" *(1422 mm)* to 82" *(2082 mm)* **Wheel base** 103" *(2616 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 32.0" *(813 mm)* Vertical distance above roadway 35.2" *(895 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph (km/h)** first 1.8 *(2.3)* second 2.7 *(4.3)* third 2.9 *(4.7)* fourth 3.6 *(5.8)* fifth 4.3 *(6.9)* sixth 5.1 *(8.2)* seventh 5.3 *(8.5)* eighth 7.5 *(12.1)* ninth 11.4 *(18.3)* tenth 16.9 *(27.2)* reverse 2.0 *(3.2)*, 3.0 *(4.8)* **Clutch** single dry disc operated by foot pedal **Brakes** double dry disc operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 144" *(3.66 m)* left 144" *(3.66 m)* (on concrete surface without brake) right 165" *(4.19 m)* left 165" *(4.19 m)* **Turning space diameter** (on concrete surface with brake applied) right 298" *(7.57 m)* left 298" *(7.57 m)* (on concrete surface without brake) right 339" *(8.61 m)* left 339" *(8.61 m)* **Power take-off** 543 rpm at 2000 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump return was 142°F *(61.2°C)*. Seven gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

TRACTOR SOUND LEVEL WITHOUT CAB	dB(A)
Maximum Available Power—Two Hours	96.0
75% of Pull at Maximum Power—Ten Hours	96.5
50% of Pull at Maximum Power—Two Hours	95.5
50% of Pull at Reduced Engine Speed—Two Hours	94.0
Bystander in 10th (5DD) Gear	92.0

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 18.4-34;6; 16 *(110)*	Two 18.4-34; 6; 16 *(110)*
Ballast	—Liquid (each)	1180 lb *(535 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 9.5L-15; 6; 36 *(250)*	Two 9.5L-15; 6; 36 *(250)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	None	None
Height of drawbar		18 in *(460 mm)*	18 in *(460 mm)*
Static weight with operator	—Rear	7910 lb *(3588 kg)*	5550 lb *(2518 kg)*
	Front	2430 lb *(1102 kg)*	2430 lb *(1102 kg)*
	Total	10340 lb *(4690 kg)*	7980 lb *(3620 kg)*

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1336.

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

International 686 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1337 — INTERNATIONAL HYDRO 86 DIESEL

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Temperature °F *(°C)* Air wet bulb	Temperature °F *(°C)* Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—652 rpm)									
	70.89	2400	5.298	0.526	13.38	194	67	75	28.917
	(52.86)		*(20.055)*	*(0.320)*	*(2.636)*	*(90.2)*	*(19.3)*	*(23.8)*	*(97.647)*
Standard Power Take-off Speed (540 rpm)—One Hour									
	66.64	1988	4.700	0.497	14.18	200	67	75	28.900
	(49.69)		*(17.791)*	*(0.302)*	*(2.793)*	*(93.5)*	*(19.5)*	*(23.7)*	*(97.591)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	63.81	2542	4.994	0.551	12.77	193	68	75	......
	(47.58)		*(18.904)*	*(0.335)*	*(2.517)*	*(89.2)*	*(20.0)*	*(23.9)*	......
	0.00	2669	2.135	.....	.....	179	68	75	......
	(0.00)		*(8.082)*	.....	.....	*(81.7)*	*(19.7)*	*(23.9)*	......
	32.89	2620	3.426	0.733	9.60	185	68	75	......
	(24.53)		*(12.969)*	*(0.446)*	*(1.891)*	*(85.0)*	*(20.0)*	*(23.9)*	......
	70.83	2400	5.301	0.527	13.36	196	69	76	......
	(52.82)		*(20.066)*	*(0.321)*	*(2.632)*	*(90.8)*	*(20.3)*	*(24.2)*	......
	16.62	2649	2.766	1.172	6.01	181	69	75	......
	(12.39)		*(10.470)*	*(0.713)*	*(1.183)*	*(82.8)*	*(20.6)*	*(23.9)*	......
	48.62	2582	4.134	0.599	11.76	189	70	76	......
	(36.26)		*(15.649)*	*(0.364)*	*(2.317)*	*(87.2)*	*(20.8)*	*(24.4)*	......
Av	**38.79**	**2577**	**3.793**	**0.688**	**10.23**	**187**	**68**	**75**	**28.843**
Av	***(28.93)***		***(14.358)***	***(0.419)***	***(2.015)***	***(86.1)***	***(20.2)***	***(24.1)***	***(97.400)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours, Speed Setting — 4.0 MPH Lo Range											
52.49	4868	4.04	2399	6.37	5.291	0.710	9.92	198	69	75	28.750
(39.14)	*(21.65)*	*(6.51)*			*(20.029)*	*(0.432)*	*(1.954)*	*(91.9)*	*(20.3)*	*(23.6)*	*(97.084)*
75% of Pull at Maximum Power—Ten Hours, Speed Setting—4.0 MPH Lo Range											
44.13	3780	4.38	2551	4.65	4.620	0.737	9.55	196	72	85	28.658
(32.91)	*(16.81)*	*(7.05)*			*(17.489)*	*(0.448)*	*(1.882)*	*(90.9)*	*(22.1)*	*(29.3)*	*(96.774)*
50% of Pull at Maximum Power—Two Hours, Speed Setting—4.0 MPH Lo Range											
31.47	2524	4.67	2589	3.11	3.817	0.854	8.24	191	72	83	28.695
(23.46)	*(11.23)*	*(7.52)*			*(14.451)*	*(0.520)*	*(1.624)*	*(88.3)*	*(22.2)*	*(28.1)*	*(96.899)*
50% of Pull at Reduced Engine Speed—Two Hours, Speed Setting—8.42 MPH Hi Range at 2400 Engine RPM											
31.50	2525	4.68	1358	3.25	2.770	0.619	11.37	191	61	68	28.915
(23.49)	*(11.23)*	*(7.53)*			*(10.485)*	*(0.377)*	*(2.240)*	*(88.1)*	*(15.8)*	*(19.7)*	*(97.642)*
MAXIMUM POWER AT SELECTED TRAVEL SPEEDS											
48.06	8815	2.04	2403	14.97	The infinitely		Lo R.	192	58	61	28.890
(35.83)	*(39.21)*	*(3.29)*						*(88.6)*	*(14.4)*	*(16.1)*	*(97.557)*
52.66	6546	3.02	2399	8.71	variable drive		Lo R.	196	59	67	28.830
(39.27)	*(29.12)*	*(4.86)*						*(91.1)*	*(15.0)*	*(19.4)*	*(97.354)*
53.69	5662	3.56	2400	7.32	control was set		Lo R.	196	58	66	28.840
(40.03)	*(25.19)*	*(5.72)*						*(91.1)*	*(14.4)*	*(18.9)*	*(97.388)*
54.10	5039	4.03	2398	6.44	by the		Lo R.	196	57	65	28.850
(40.34)	*(22.41)*	*(6.48)*						*(91.1)*	*(13.9)*	*(18.3)*	*(97.422)*
53.88	4430	4.56	2399	5.68	manufacturer		Lo R.	197	60	69	28.830
(40.17)	*(19.71)*	*(7.34)*						*(91.4)*	*(15.6)*	*(20.6)*	*(97.355)*
53.41	3960	5.06	2399	4.91	to give the		Lo R.	196	62	70	28.820
(39.83)	*(17.61)*	*(8.14)*						*(91.1)*	*(16.7)*	*(21.1)*	*(97.321)*
52.26	3524	5.56	2398	4.34	travel speeds		Lo R.	196	62	70	28.820
(38.97)	*(15.68)*	*(8.95)*						*(91.1)*	*(16.7)*	*(21.1)*	*(97.321)*
51.12	3155	6.08	2400	3.91	shown.		Hi R.	197	62	70	28.820
(38.12)	*(14.03)*	*(9.78)*						*(91.4)*	*(16.7)*	*(21.1)*	*(97.321)*
52.02	2959	6.59	2398	3.69			Hi R.	196	63	71	28.810
(38.79)	*(13.16)*	*(10.61)*						*(91.1)*	*(17.2)*	*(21.7)*	*(97.287)*
52.64	2815	7.01	2399	3.54			Hi R.	196	64	71	28.800
(39.25)	*(12.52)*	*(11.29)*						*(91.1)*	*(17.8)*	*(21.7)*	*(97.253)*
53.27	2643	7.56	2399	3.33			Hi R.	196	65	71	28.790
(39.72)	*(11.76)*	*(12.16)*						*(90.8)*	*(18.3)*	*(21.7)*	*(97.220)*
53.68	2484	8.10	2399	2.88			Hi R.	196	66	71	28.780
(40.03)	*(11.05)*	*(13.04)*						*(91.1)*	*(18.9)*	*(21.7)*	*(97.186)*

Department of Agricultural Engineering

Dates of Test: March 27 to September 17, 1980

Manufacturer: INTERNATIONAL HARVESTER COMPANY, 401 North Michigan Avenue, Chicago, IL 60611.

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** ***(15°/15°)*** 0.8455 **Fuel weight** 7.040 lbs/gal *(0.844 kg/l)* **Oil SAE** 30 **API service classification** CA/CD-SC/SE **To motor** 4.995 gal *(18.906 l)* **Drained from motor** 4.813 gal *(18.217 l)* **Transmission and final drive lubricant** I.H. Hy-Tran Fluid **Total time engine was operated** 73.5 hours

ENGINE Make International Diesel **Type** 6 cylinder vertical **Serial No.** 310DT2D095469* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 3.875" × 4.375" *(98.4 mm × 111.1 mm)* **Compression ratio** 15.1 to 1 **Displacement** 310 cu in *(5080 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element **Oil filter** one full flow cartridge **Oil cooler** radiator for hydraulic and transmission oil **Fuel filter** two paper elements **Muffler** vertical **Cooling medium temperature control** one thermostat

CHASSIS: Type standard **Serial No.** 2680028U009039* **Tread width** rear 50" *(1270 mm)* to 96" *(2438 mm)* front 56" *(1422 mm)* to 82" *(2082 mm)* **Wheel base** 103" *(2616 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 32.3" *(820 mm)* Vertical distance above roadway 35.5" *(902 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** infinitely variable hydrostatic using a variable displacement pump and motor. A range transmission provides Hi and Lo range **Advertised speeds mph (km/h)** Lo range 0—8.0 *(0—12.9)*; Hi range 0—21.6 *(0—34.8)*; reverse Lo range 0—3.6 *(0—5.9)*, Hi range 0—9.8 *(0—15.8)* **Clutch** none-hydrostatic drive can be controlled by foot pedal **Brakes** double dry disc operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 144" *(3.66 m)* left 144" *(3.66 m)* (on concrete surface without brake) right 165" *(4.19 m)* left 165" *(4.19 m)* **Turning space diameter** (on concrete surface with brake applied) right 298" *(7.57 m)* left 298" *(7.57 m)* (on concrete surface without brake) right 339" *(8.61 m)* left 339" *(8.61 m)* **Power take-off** 540 rpm at 1988 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs. Fuel adjusted as shown below.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump return was 145°F *(62.8°C)*. Twelve travel speeds were chosen between 15% slip and 10 mph *(16.1*

LUGGING ABILITY IN SPEED SETTING—4.0 MPH Lo Range

Crankshaft Speed rpm	2398	2158	1918	1677	1440	1202
Pull—lbs *(kN)*	5039 *(22.41)*	5582 *(24.83)*	5926 *(26.36)*	5939 *(26.42)*	6086 *(27.07)*	6063 *(26.97)*
Increase in Pull %	0	11	18	18	21	20
Power—Hp *(kW)*	54.10 *(40.34)*	53.29 *(39.74)*	49.35 *(36.80)*	43.23 *(32.24)*	37.75 *(28.15)*	31.35 *(23.38)*
Speed—Mph *(km/h)*	4.03 *(6.48)*	3.58 *(5.76)*	3.12 *(5.03)*	2.73 *(4.39)*	2.33 *(3.74)*	1.94 *(3.12)*
Slip %	6.44	7.25	7.79	7.92	8.45	8.19

TRACTOR SOUND LEVEL WITHOUT CAB	dB(A)
Maximum Available Power—Two Hours	98.0
75% of Pull at Maximum Power—Ten Hours	97.5
50% of Pull at Maximum Power—Two Hours	96.0
50% of Pull at Reduced Engine Speed—Two Hours	95.0
Bystander in Hi Range	90.5

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 18.4-34; 6; 16 *(110)*	Two 18.4-34; 6; 16 *(110)*
Ballast	—Liquid (each inner)	1273 lb *(577 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 9.5L-15; 6; 36 *(250)*	Two 9.5L-15; 6; 36 *(250)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	None	None
Height of drawbar		19 in *(485 mm)*	19 in *(485 mm)*
Static Weight with Operator	—Rear	8220 lb *(3729 kg)*	5675 lb *(2575 kg)*
	Front	2490 lb *(1129 kg)*	2490 lb *(1129 kg)*
	Total	10710 lb *(4858 kg)*	8165 lb *(3704 kg)*

km/h). Drawbar horsepower did not meet manufacturer's claim upon completion of first test sequence. The fuel rate was readjusted, the oil changed at 39 hours and the test repeated.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1337.**

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

International Hydro 86 Diesel

NEBRASKA TRACTOR TEST 1338 — INTERNATIONAL 886 DIESEL
16 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—1159 rpm)									
	86.57	2400	5.774	0.471	14.99	191	54	75	28.860
	(64.55)		*(21.856)*	*(0.287)*	*(2.954)*	*(88.3)*	*(12.2)*	*(23.9)*	*(97.456)*
Standard Power Take-Off Speed (1000 rpm)—One Hour									
	83.91	2071	5.241	0.441	16.01	195	54	75	28.825
	(62.57)		*(19.838)*	*(0.268)*	*(3.154)*	*(90.7)*	*(12.2)*	*(23.9)*	*(97.338)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	78.38	2554	5.535	0.499	14.16	188	54	75	......
	(58.45)		*(20.953)*	*(0.303)*	*(2.790)*	*(86.7)*	*(12.2)*	*(23.9)*	......
	0.00	2643	2.048	.....	.....	177	54	75	......
	(0.00)		*(7.751)*	.....	.....	*(80.6)*	*(12.2)*	*(23.9)*	......
	39.79	2604	3.573	0.634	11.14	183	54	75	......
	(29.67)		*(13.524)*	*(0.386)*	*(2.194)*	*(83.9)*	*(12.2)*	*(23.9)*	......
	86.61	2400	5.765	0.470	15.02	192	54	75	......
	(64.59)		*(21.822)*	*(0.286)*	*(2.960)*	*(89.2)*	*(12.2)*	*(23.9)*	......
	20.20	2622	2.766	0.967	7.30	178	54	75	......
	(15.06)		*(10.469)*	*(0.588)*	*(1.439)*	*(81.1)*	*(12.2)*	*(23.9)*	......
	59.29	2580	4.469	0.532	13.27	186	54	75	......
	(44.21)		*(16.917)*	*(0.324)*	*(2.613)*	*(85.8)*	*(12.2)*	*(23.9)*	......
Av	**47.38**	**2567**	**4.026**	**0.600**	**11.77**	**184**	**54**	**75**	**28.780**
Av	***(35.33)***		***(15.239)***	***(0.365)***	***(2.318)***	***(84.5)***	***(12.2)***	***(23.9)***	***(97.186)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption			Temp. °F *(°C)*			Barom. inch Hg *(kPa)*
					gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cool-ing med	Air wet bulb	Air dry bulb	
Maximum Available Power—Two Hours 8th (1Hi TA) Gear											
75.08	5995	4.70	2400	5.05	5.788	0.544	12.97	189	50	63	28.850
(55.99)	*(26.67)*	*(7.56)*			*(21.910)*	*(0.331)*	*(2.555)*	*(86.9)*	*(10.0)*	*(16.9)*	*(97.422)*
75% of Pull at Maximum Power—Ten Hours 8th (1Hi TA) Gear											
61.45	4580	5.03	2536	3.70	5.034	0.578	12.21	180	41	50	28.856
(45.83)	*(20.37)*	*(8.10)*			*(19.056)*	*(0.352)*	*(2.405)*	*(82.4)*	*(4.9)*	*(9.9)*	*(97.442)*
50% of Pull at Maximum Power—Two Hours 8th (1Hi TA) Gear											
41.75	3049	5.13	2552	2.31	3.929	0.665	10.62	178	42	48	28.815
(31.13)	*(13.56)*	*(8.26)*			*(14.875)*	*(0.404)*	*(2.093)*	*(80.8)*	*(5.3)*	*(8.9)*	*(97.304)*
50% of Pull at Reduced Engine Speed—Two Hours 12th (2Hi DD) Gear											
41.89	3055	5.14	1499	2.35	3.115	0.525	13.45	180	42	48	28.850
(31.24)	*(13.59)*	*(8.27)*			*(11.793)*	*(0.319)*	*(2.649)*	*(82.2)*	*(5.3)*	*(8.9)*	*(97.422)*
MAXIMUM POWER IN SELECTED GEARS											
62.89	10807	2.18	2549	14.83	4th (2Lo DD) Gear			179	42	49	28.850
(46.89)	*(48.07)*	*(3.51)*						*(81.4)*	*(5.6)*	*(9.4)*	*(97.422)*
73.32	9280	2.96	2400	9.36	5th (3Lo TA) Gear			185	45	53	28.940
(54.67)	*(41.28)*	*(4.77)*						*(85.0)*	*(7.2)*	*(11.7)*	*(97.726)*
74.15	7081	3.93	2399	6.14	6th (3Lo DD) Gear			188	44	52	28.940
(55.30)	*(31.50)*	*(6.32)*						*(86.4)*	*(6.7)*	*(11.1)*	*(97.726)*
74.76	6837	4.10	2400	5.93	7th (4Lo TA) Gear			187	44	51	28.950
(55.75)	*(30.41)*	*(6.60)*						*(85.8)*	*(6.7)*	*(10.6)*	*(97.760)*
76.25	6095	4.69	2398	5.02	8th (1Hi TA) Gear			190	51	64	28.840
(56.86)	*(27.11)*	*(7.55)*						*(87.5)*	*(10.6)*	*(17.8)*	*(97.388)*
74.79	5245	5.35	2400	4.30	9th (4Lo DD) Gear			188	45	54	28.930
(55.77)	*(23.33)*	*(8.61)*						*(86.4)*	*(7.2)*	*(12.2)*	*(97.692)*
75.74	4657	6.10	2399	3.79	10th (1Hi DD) Gear			188	46	56	28.930
(56.48)	*(20.71)*	*(9.82)*						*(86.4)*	*(7.8)*	*(13.3)*	*(97.692)*
76.22	4511	6.34	2398	3.57	11th (2Hi TA) Gear			188	46	57	28.920
(56.84)	*(20.07)*	*(10.20)*						*(86.7)*	*(7.8)*	*(13.9)*	*(97.659)*
74.31	3396	8.21	2399	2.61	12th (2Hi DD) Gear			188	47	58	28.910
(55.41)	*(15.10)*	*(13.21)*						*(86.7)*	*(8.3)*	*(14.4)*	*(97.625)*

Department of Agricultural Engineering

Dates of Test: March 26 to April 10, 1980

Manufacturer: INTERNATIONAL HARVESTER CO., 401 North Michigan Avenue, Chicago, Illinois 60611

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 30 **API service classification** CA/CD-SC/SE **To motor** 2.606 gal *(9.865 l)* **Drained from motor** 2.505 gal *(9.482 l)* **Transmission and final drive lubricant** I.H. Hy-Tran Fluid **Total time engine was operated** 38.0 hours.

ENGINE Make International Diesel **Type** 6 cylinder vertical **Serial No.** 358DT2D050083* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 3.875" × 5.0625" *(98.4 mm × 128.6 mm)* **Compression ratio** 14.8 to 1 **Displacement** 358 cu in *(5868 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with automatic dust unloader **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for transmission and hydraulic oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** one thermostat

CHASSIS: Type standard with duals **Serial No.** 2490206U15954* **Tread width** rear 66" *(1676 mm)* to 113.5" *(2883 mm)* front 60" *(1520 mm)* to 84" *(2130 mm)* **Wheel base** 104.8" *(2662 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.4" *(798 mm)* Vertical distance above roadway 40.5" *(1029 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph *(km/h)*** first 1.4 *(2.2)* second 1.8 *(2.8)* third 1.8 *(3.0)* fourth 2.4 *(3.8)* fifth 3.2 *(5.1)* sixth 4.1 *(6.6)* seventh 4.2 *(6.8)* eighth 4.8 *(7.8)* ninth 5.4 *(8.8)* tenth 6.2 *(10.0)* eleventh 6.4 *(10.3)* twelfth 8.2 *(13.2)* thirteenth 11.1 *(17.9)* fourteenth 14.3 *(23.0)* fifteenth 14.9 *(23.9)* sixteenth 19.1 *(30.7)* reverse 2.4 *(3.8)*, 3.0 *(4.9)*, 3.2 *(5.1)*, 4.0 *(6.5)*, 5.5 *(8.8)*, 7.0 *(11.3)*, 7.3 *(11.7)*, 9.4 *(15.1)* **Clutch** single dry disc hydraulically actuated and operated by foot pedal **Brakes** multiple wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 138" *(3.51 m)* left 138" *(3.51 m)* (on concrete surface without brake) right 175" *(4.44 m)* left 175" *(4.44 m)* **Turning space diameter** (on concrete surface with brake applied) right 286" *(7.26 m)* left 286" *(7.26 m)* (on concrete surface without brake) right 360" *(9.14 m)* left 360" *(9.14 m)* **Power take-off** 1000 rpm at 2071 engine rpm and 540 rpm at 2106 engine rpm.

LUGGING ABILITY IN 8th (1Hi TA) GEAR

Crankshaft Speed rpm	2398	2158	1916	1678	1444	1200
Pull—lbs *(kN)*	6095 *(27.11)*	6803 *(30.26)*	7380 *(32.83)*	7889 *(35.09)*	8014 *(35.65)*	7874 *(35.03)*
Increase in Pull %	0	12	21	29	31	29
Power—Hp *(kW)*	76.25 *(56.86)*	75.92 *(56.61)*	72.70 *(54.21)*	67.57 *(50.39)*	58.88 *(43.91)*	48.17 *(35.92)*
Speed—Mph *(km/h)*	4.69 *(7.55)*	4.18 *(6.73)*	3.69 *(5.94)*	3.21 *(5.17)*	2.76 *(4.43)*	2.29 *(3.69)*
Slip %	5.02	5.93	6.35	7.03	7.30	7.17

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	80.0
75% of Pull at Maximum Power—Ten Hours	79.0
50% of Pull at Maximum Power—Two Hours	79.5
50% of Pull at Reduced Engine Speed—Two Hours	80.0
Bystander in 16th (4Hi DD) gear	88.0

TIRES, BALLAST AND WEIGHT		**With Ballast**	**Without Ballast**
Rear Tires	—No., size, ply & psi *(kPa)*	Four 18.4-34; 6; 12 *(80)*	Four 18.4-34; 6; 12 *(80)*
Ballast	—Liquid (each inner)	815 lb *(370 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 9.5L-15; 6; 36 *(250)*	Two 9.5L-15; 6; 36 *(250)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	40 lb *(18 kg)*	None
Height of drawbar		19 in *(485 mm)*	19 in *(485 mm)*
Static Weight with Operator	—Rear	10130 lb *(4595 kg)*	8500 lb *(3855 kg)*
	Front	3320 lb *(1506 kg)*	3240 lb *(1470 kg)*
	Total	13450 lb *(6101 kg)*	11740 lb *(5325 kg)*

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump return was 130°F *(54.4°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1338.**

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

International 886 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1339 — INTERNATIONAL 886 DIESEL 16 SPEED

(SERIAL NUMBERS 2490208U17026* and HIGHER)

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—1158 rpm)									
	90.56 *(67.53)*	2400	6.073 *(22.987)*	0.474 *(0.288)*	14.91 *(2.938)*	193 *(89.3)*	55 *(12.8)*	75 *(23.8)*	28.960 *(97.794)*
Standard Power Take-off Speed (1000 rpm)—One Hour									
	88.23 *(65.79)*	2072	5.569 *(21.082)*	0.446 *(0.271)*	15.84 *(3.121)*	198 *(92.2)*	55 *(12.7)*	75 *(23.9)*	28.960 *(97.794)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	82.04 *(61.18)*	2558	5.709 *(21.613)*	0.491 *(0.299)*	14.37 *(2.831)*	188 *(86.9)*	55 *(12.8)*	75 *(23.9)*	....
	0.00 *(0.00)*	2655	2.026 *(7.671)*	....	....	177 *(80.6)*	55 *(12.8)*	75 *(23.9)*	....
	41.97 *(31.29)*	2608	3.658 *(13.846)*	0.615 *(0.374)*	11.47 *(2.260)*	183 *(83.9)*	56 *(13.1)*	75 *(23.9)*	....
	90.79 *(67.70)*	2402	6.092 *(23.060)*	0.474 *(0.288)*	14.90 *(2.936)*	193 *(89.4)*	56 *(13.3)*	75 *(23.9)*	....
	21.17 *(15.78)*	2630	2.795 *(10.581)*	0.933 *(0.567)*	7.57 *(1.492)*	178 *(81.1)*	56 *(13.3)*	75 *(23.9)*	....
	62.13 *(46.33)*	2586	4.592 *(17.383)*	0.522 *(0.318)*	13.53 *(2.665)*	186 *(85.6)*	56 *(13.3)*	75 *(23.9)*	....
Av ***Av***	**49.68** ***(37.05)***	**2573**	**4.145** ***(15.692)***	**0.589** ***(0.358)***	**11.98** ***(2.361)***	**184** ***(84.6)***	**56** ***(13.1)***	**75** ***(23.9)***	**28.950** ***(97.760)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 8th (1Hi TA) Gear											
77.78 *(58.00)*	6221 *(27.67)*	4.69 *(7.55)*	2398	5.26	6.071 *(22.982)*	0.551 *(0.335)*	12.81 *(2.524)*	187 *(85.8)*	42 *(5.3)*	53 *(11.7)*	28.660 *(96.781)*
75% of Pull at Maximum Power—Ten Hours 8th (1Hi TA) Gear											
64.99 *(48.46)*	4814 *(21.42)*	5.06 *(8.15)*	2551	3.80	5.250 *(19.873)*	0.570 *(0.347)*	12.38 *(2.439)*	183 *(84.1)*	44 *(6.9)*	59 *(14.8)*	28.845 *(97.405)*
50% of Pull at Maximum Power—Two Hours 8th (1Hi TA) Gear											
44.21 *(32.97)*	3207 *(14.27)*	5.17 *(8.32)*	2573	2.64	4.071 *(15.411)*	0.650 *(0.396)*	10.86 *(2.139)*	179 *(81.4)*	42 *(5.6)*	55 *(12.8)*	28.640 *(96.713)*
50% of Pull at Reduced Engine Speed—Two Hours 12th (2Hi DD) Gear											
44.26 *(33.01)*	3209 *(14.28)*	5.17 *(8.32)*	1509	2.56	3.257 *(12.329)*	0.520 *(0.316)*	13.59 *(2.677)*	182 *(83.3)*	45 *(7.2)*	57 *(13.6)*	28.965 *(97.810)*
MAXIMUM POWER IN SELECTED GEARS											
63.76 *(47.54)*	10930 *(48.62)*	2.19 *(3.52)*	2552	14.77	4th (2 Lo DD) Gear			180 *(81.9)*	43 *(6.1)*	54 *(12.2)*	28.980 *(97.861)*
76.86 *(57.32)*	9740 *(43.32)*	2.96 *(4.76)*	2400	9.55	5th (3 Lo TA) Gear			182 *(83.3)*	39 *(3.9)*	47 *(8.3)*	28.720 *(96.983)*
77.67 *(57.92)*	7415 *(32.98)*	3.93 *(6.32)*	2400	6.27	6th (3 Lo DD) Gear			185 *(85.0)*	38 *(3.3)*	46 *(7.8)*	28.730 *(97.017)*
78.02 *(58.18)*	7135 *(31.74)*	4.10 *(6.60)*	2401	6.13	7th (4 Lo TA) Gear			186 *(85.3)*	38 *(3.3)*	45 *(7.2)*	28.740 *(97.051)*
80.13 *(59.75)*	6409 *(28.51)*	4.69 *(7.55)*	2398	5.22	8th (1 Hi TA) Gear			185 *(85.0)*	34 *(1.1)*	40 *(4.4)*	28.760 *(97.118)*
78.09 *(58.23)*	5482 *(24.38)*	5.34 *(8.60)*	2398	4.51	9th (4 Lo DD) Gear			186 *(85.6)*	39 *(3.9)*	48 *(8.9)*	28.710 *(96.949)*
78.48 *(58.52)*	4822 *(21.45)*	6.10 *(9.82)*	2401	3.93	10th (1 Hi DD) Gear			186 *(85.6)*	40 *(4.4)*	49 *(9.4)*	28.700 *(96.916)*
79.30 *(59.13)*	4692 *(20.87)*	6.34 *(10.20)*	2399	3.64	11th (2 Hi TA) Gear			187 *(85.8)*	40 *(4.4)*	50 *(10.0)*	28.700 *(96.916)*
77.24 *(57.60)*	3533 *(15.72)*	8.20 *(13.19)*	2398	2.82	12th (2 Hi DD) Gear			185 *(85.0)*	41 *(5.0)*	51 *(10.6)*	28.690 *(96.882)*

Department of Agricultural Engineering

Dates of Test: April 10 to 18, 1980

Manufacturer: INTERNATIONAL HARVESTER COMPANY, 401 North Michigan Avenue, Chicago, IL 60611.

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** ***(15°/15°)*** 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE 30 API service classification** CA/CD-SC/SE **To motor** 2.606 gal *(9.864 l)* **Drained from motor** 2.450 gal *(9.273 l)* **Transmission and final drive lubricant** I.H. Hy-tran fluid **Total time engine was operated** 33.5 hours

ENGINE Make International Diesel **Type** six cylinder vertical **Serial No.** 358DT2D050083* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 3.875" × 5.0625" *(98.4 mm × 128.6 mm)* **Compression ratio** 14.8 to 1 **Displacement** 358 cu in *(5868 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with automatic dust unloader **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for transmission and hydraulic oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** one thermostat

CHASSIS: Type standard with duals **Serial No.** 2490206U15954* **Tread width** rear 66" *(1676 mm)* to 113.5" *(2883 mm)* front 60" *(1520 mm)* to 84" *(2130 mm)* **Wheel base** 104.8" *(2662 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.4" *(798 mm)* Vertical distance above roadway 40.5" *(1029 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph** ***(km/h)*** first 1.4 *(2.2)* second 1.8 *(2.8)* third 1.8 *(3.0)* fourth 2.4 *(3.8)* fifth 3.2 *(5.1)* sixth 4.1 *(6.6)* seventh 4.2 *(6.8)* eighth 4.8 *(7.8)* ninth 5.4 *(8.8)* tenth 6.2 *(10.0)* eleventh 6.4 *(10.3)* twelfth 8.2 *(13.2)* thirteenth 11.1 *(17.9)* fourteenth 14.3 *(23.0)* fifteenth 14.9 *(23.9)* sixteenth 19.1 *(30.7)* reverse 2.4 *(3.8)*, 3.0 *(4.9)*, 3.2 *(5.1)*, 4.0 *(6.5)*, 5.5 *(8.8)*, 7.0 *(11.3)*, 7.3 *(11.7)*, 9.4 *(15.1)* **Clutch** single dry disc hydraulically actuated and operated by foot pedal **Brakes** multiple wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 138" *(3.51 m)* left 138" *(3.51 m)* (on concrete surface without brake) right 175" *(4.44 m)* left 175" *(4.44 m)* **Turning space diameter** (on concrete surface with brake applied) right 286" *(7.26 m)* left 286" *(7.26 m)* (on

LUGGING ABILITY IN 8th (1 Hi TA) GEAR

Crankshaft Speed rpm	2396	2157	1921	1677	1435	1204
Pull—lbs *(kN)*	6409 *(28.51)*	7123 *(31.68)*	7744 *(34.45)*	8177 *(36.38)*	8293 *(36.89)*	8134 *(36.18)*
Increase in Pull %	0	11	21	28	29	27
Power—Hp *(kW)*	80.13 *(59.75)*	79.44 *(59.24)*	76.42 *(56.98)*	69.96 *(52.17)*	60.65 *(45.23)*	49.95 *(37.25)*
Speed—Mph *(km/h)*	4.69 *(7.55)*	4.18 *(6.73)*	3.70 *(5.96)*	3.21 *(5.16)*	2.74 *(4.41)*	2.30 *(3.71)*
Slip %	5.22	6.06	6.62	7.16	7.30	7.16

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	80.0
75% of Pull at Maximum Power—Ten Hours	79.5
50% of Pull at Maximum Power—Two Hours	78.5
50% of Pull at Reduced Engine Speed—Two Hours	79.0
Bystander in 16th (4 Hi DD) gear	89.0

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Four 18.4-34; 6; 12 *(85)*	Four 18.4-34; 6; 12 *(85)*
Ballast	—Liquid (each inner)	815 lb *(370 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 9.5L-15; 6; 36 *(250)*	Two 9.5L-15; 6; 36 *(250)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	40 lb *(18 kg)*	None
Height of Drawbar		19 in *(485 mm)*	19 in *(485 mm)*
Static Weight with Operator—Rear		10130 lb *(4595 kg)*	8500 lb *(3855 kg)*
Front		3320 lb *(1506 kg)*	3240 lb *(1470 kg)*
Total		13450 lb *(6101 kg)*	11740 lb *(5325 kg)*

concrete surface without brake) right 360" *(9.14 m)* left 360" *(9.14 m)* **Power take-off** 1000 rpm at 2072 engine rpm and 540 rpm at 2106 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump return was 131°F *(55.2°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)* The performance figures on this report apply after tractor chassis Serial No. 2490208U17026*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1339.**

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

International 886 Diesel 16 Speed

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1340 — LEYLAND 482 DIESEL ALSO LEYLAND 282 DIESEL 9 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—655 rpm)									
	74.28 *(55.39)*	2200	4.748 *(17.973)*	0.451 *(0.275)*	15.64 *(3.082)*	222 *(105.7)*	59 *(15.0)*	75 *(23.9)*	29.153 *(98.446)*
Standard Power Take-off Speed (540 rpm)—One Hour									
	70.86 *(52.84)*	1813	4.030 *(15.255)*	0.402 *(0.244)*	17.58 *(3.464)*	222 *(105.5)*	59 *(15.0)*	75 *(24.0)*	29.130 *(98.368)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	64.25 *(47.91)*	2240	4.252 *(16.097)*	0.467 *(0.284)*	15.11 *(2.977)*	212 *(100.3)*	59 *(15.0)*	75 *(23.9)*	....
	0.00 *(0.00)*	2361	1.402 *(5.307)*	....	....	184 *(84.4)*	59 *(15.0)*	75 *(23.9)*	....
	33.07 *(24.66)*	2304	2.829 *(10.710)*	0.604 *(0.368)*	11.69 *(2.302)*	190 *(88.1)*	59 *(15.0)*	75 *(23.9)*	....
	75.76 *(56.50)*	2200	4.771 *(18.059)*	0.445 *(0.270)*	15.88 *(3.128)*	218 *(103.3)*	59 *(15.0)*	75 *(23.9)*	....
	16.73 *(12.47)*	2331	2.107 *(7.976)*	0.890 *(0.541)*	7.94 *(1.564)*	186 *(85.8)*	59 *(15.0)*	75 *(23.9)*	....
	48.92 *(36.48)*	2272	3.539 *(13.395)*	0.511 *(0.311)*	13.83 *(2.724)*	194 *(89.7)*	59 *(15.0)*	75 *(23.9)*	....
Av ***Av***	**39.79** ***(29.67)***	**2285**	**3.150** ***(11.924)***	**0.559** ***(0.340)***	**12.63** ***(2.488)***	**198** ***(91.9)***	**59** ***(15.0)***	**75** ***(23.9)***	**29.093** ***(98.244)***

DRAWBAR PERFORMANCE (Front Wheel Drive Disengaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 5th (M-2) Gear											
58.20 *(43.40)*	3722 *(16.55)*	5.86 *(9.44)*	2201	7.50	4.584 *(17.354)*	0.556 *(0.338)*	12.70 *(2.501)*	235 *(112.8)*	60 *(15.3)*	87 *(30.3)*	28.845 *(97.405)*
75% of Pull at Maximum Power—Ten Hours 5th (M-2) Gear											
47.50 *(35.42)*	2939 *(13.07)*	6.06 *(9.76)*	2226	5.43	3.926 *(14.861)*	0.584 *(0.355)*	12.10 *(2.384)*	211 *(99.3)*	61 *(15.9)*	83 *(28.1)*	28.797 *(97.243)*
50% of Pull at Maximum Power—Two Hours 5th (M-2) Gear											
33.58 *(25.04)*	1987 *(8.84)*	6.34 *(10.20)*	2289	3.77	3.328 *(12.597)*	0.700 *(0.426)*	10.09 *(1.988)*	190 *(87.5)*	58 *(14.4)*	72 *(21.9)*	28.925 *(97.675)*
50% of Pull at Reduced Engine Speed—Two Hours 7th (H-1) Gear											
33.48 *(24.97)*	1976 *(8.79)*	6.35 *(10.23)*	1248	3.63	2.283 *(8.643)*	0.482 *(0.293)*	14.66 *(2.889)*	223 *(105.8)*	62 *(16.7)*	89 *(31.7)*	28.795 *(97.236)*
MAXIMUM POWER IN SELECTED GEARS											
46.22 *(34.47)*	7032 *(31.28)*	2.46 *(3.97)*	2243	14.87		2nd (L-2) Gear		191 *(88.1)*	46 *(7.8)*	56 *(13.3)*	28.920 *(97.659)*
56.29 *(41.97)*	6440 *(28.65)*	3.28 *(5.27)*	2200	12.91		3rd (L-3) Gear		194 *(89.7)*	46 *(7.8)*	56 *(13.3)*	28.920 *(97.659)*
60.31 *(44.97)*	5176 *(23.02)*	4.37 *(7.03)*	2201	10.44		4th (M-1) Gear		232 *(111.1)*	60 *(15.6)*	81 *(27.2)*	28.870 *(97.490)*
61.19 *(45.63)*	3919 *(17.43)*	5.86 *(9.42)*	2201	7.57		5th (M-2) Gear		224 *(106.4)*	57 *(13.9)*	71 *(21.7)*	28.860 *(97.456)*
60.66 *(45.24)*	2869 *(12.76)*	7.93 *(12.76)*	2201	5.57		6th (M-3) Gear		230 *(109.7)*	60 *(15.6)*	82 *(27.8)*	28.870 *(97.490)*

Department of Agricultural Engineering

Dates of Test: April 15-25, 1980

Manufacturer: LEYLAND VEHICLES LIMITED MLVD, Blackburn Road, Bathgate, West Lothian, Scotland.

FUEL, OIL AND TIME: **Fuel** No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** ***(15°/15°)*** 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 20-20W **API service classification** SB/SE-CA/CD **To motor** 2.656 gal *(10.051 l)* **Drained from motor** 1.995 gal *(7.551 l)* **Transmission and final drive lubricant** SAE 20W30 **Total time engine was operated** 48.0 hours

ENGINE: **Make** Leyland Dsl **Type** four cylinder vertical with turbocharger **Serial No.** 498NT177659543 **Crankshaft** lengthwise **Rated rpm** 2200 **Bore and stroke** 3.858" × 4.921" *(98 mm × 125 mm)* **Compression ratio** 16.8 to 1 **Displacement** 230 cu in *(3771 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element **Oil filter** one full flow element **Fuel filter** one paper cartridge and two gauze screens **Muffler** none **Cooling medium temperature control** one thermostat.

CHASSIS: **Type** Front wheel assist **Serial No.** 247589 **Tread width** rear 60" *(1520 mm)* to 80" *(2032 mm)* front 61" *(1549 mm)* to 73" *(1854 mm)* **Wheel base** 83.28" *(2115 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 32.9" *(835 mm)* Vertical distance above roadway 33.8" *(859 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph** ***(km/h)*** first 2.2 *(3.6)* second 2.9 *(4.6)* third 3.8 *(6.2)* fourth 5.0 *(8.0)* fifth 6.4 *(10.4)* sixth 8.5 *(13.7)* seventh 11.8 *(19.0)* eighth 15.3 *(24.6)* ninth 20.3 *(32.7)* reverse 3.3 *(5.2)*, 7.3 *(11.7)*, 17.3 *(27.8)* **Clutch** double dry disc hydraulically operated by foot pedal **Brakes** multiple dry disc hydraulically operated by two foot pedals which can be locked together and hand lever **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 176" *(4.47 m)* left 172" *(4.37 m)* (on concrete surface without brake) right 211" *(5.36 m)* left 208" *(5.29 m)* **Turning space diameter** (on concrete surface with brake applied) right 352" *(8.94 m)* left 344" *(8.74 m)* (on concrete surface without brake) right 422" *(10.71 m)* left 417" *(10.59 m)* **Power take-off** 540 rpm at 1813 engine rpm.

LUGGING ABILITY IN 5th (M-2) GEAR

Crankshaft Speed rpm	2201	1970	1761	1539	1315	1096
Pull—lbs	3919	4386	4673	4754	4656	4550
(kN)	*(17.43)*	*(19.51)*	*(20.79)*	*(21.15)*	*(20.71)*	*(20.24)*
Increase in Pull %	0	12	19	21	19	16
Power—Hp	61.19	60.66	57.24	50.75	42.57	34.75
(kW)	*(45.63)*	*(45.24)*	*(42.68)*	*(37.84)*	*(31.74)*	*(25.91)*
Speed—Mph	5.86	5.19	4.59	4.00	3.43	2.86
(km/h)	*(9.42)*	*(8.35)*	*(7.39)*	*(6.44)*	*(5.52)*	*(4.61)*
Slip %	7.57	8.65	9.40	9.77	9.52	9.27

TRACTOR SOUND LEVEL WITH CAB	dB(A)	Front Wheel Drive Disengaged dB(A)
Maximum Available Power—Two Hours	83.5	85.0
75% of Pull at Maximum Power—Ten Hours	-	85.5
50% of Pull at Maximum Power—Two Hours	-	87.5
50% of Pull at Reduced Engine Speed—Two Hours	-	80.0
Bystander in 8th (H-2) gear	-	90.5

DRAWBAR PERFORMANCE
(Front Wheel Drive Engaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 5th (M-2) Gear											
56.04	3417	6.15	2198	4.91	4.478	0.564	12.51	204	48	60	28.915
(41.79)	*(15.20)*	*(9.90)*			*(16.952)*	*(0.343)*	*(2.465)*	*(95.6)*	*(8.9)*	*(15.6)*	*(97.642)*
MAXIMUM POWER IN SELECTED GEARS											
48.99	9480	1.94	2240	14.92	1st (L-1) Gear			190	45	55	28.920
(36.53)	*(42.17)*	*(3.12)*						*(87.8)*	*(7.2)*	*(12.8)*	*(97.659)*
61.48	4964	4.64	2201	6.92	4th (M-1) Gear			232	59	77	28.870
(45.85)	*(22.08)*	*(7.47)*						*(111.1)*	*(15.0)*	*(25.0)*	*(97.490)*
61.38	3740	6.15	2203	5.01	5th (M-2) Gear			225	58	76	28.870
(45.77)	*(16.64)*	*(9.90)*						*(107.2)*	*(14.4)*	*(24.4)*	*(97.490)*

TIRES, BALLAST AND WEIGHT		**With Ballast**	**Without Ballast**
Rear Tires	—No., size, ply & psi *(kPa)*	Two 16.9-34; 8; 16 *(110)*	Two 16.9-34; 8; 16 *(110)*
Ballast	—Liquid (each)	900 lb *(408 kg)*	None
	—Cast Iron (each)	425 lb *(193 kg)*	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 12.4/11-28; 6; 20 *(140)*	Two 12.4/11-28; 6; 20 *(140)*
Ballast	—Liquid (each)	400 lb *(181 kg)*	None
	—Cast Iron (each)	570 lb *(259 kg)*	None
Height of Drawbar		18.5 in *(470 mm)*	18.5 in *(470 mm)*
Static Weight with Operator	—Rear	7140 lb *(3239 kg)*	4490 lb *(2037 kg)*
	—Front	4860 lb *(2204 kg)*	2920 lb *(1324 kg)*
	—Total	12000 lb *(5443 kg)*	7410 lb *(3361 kg)*

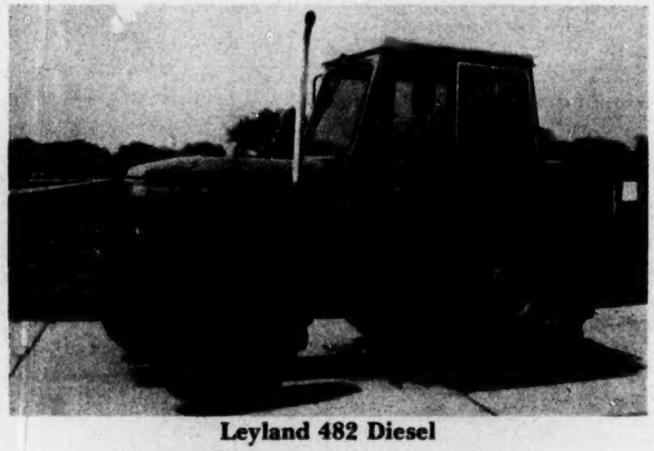
REPAIRS and ADJUSTMENTS: The bolts holding the rear wheel weights were retightened following the 50% drawbar fuel test.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 165°F *(74.0°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1340**.

LOUIS I. LEVITICUS
Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers



Leyland 482 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1341 — LEYLAND 472 DIESEL ALSO LEYLAND 272 DIESEL 9 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption			Temperature °F *(°C)*			
			gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—655 rpm)									
	63.52 *(47.37)*	2200	4.584 *(17.351)*	0.510 *(0.310)*	13.86 *(2.730)*	226 *(107.9)*	59 *(14.9)*	75 *(24.0)*	28.877 *(97.512)*
Standard Power Take-off Speed (540 rpm)—One Hour									
	58.50 *(43.62)*	1813	3.908 *(14.794)*	0.472 *(0.287)*	14.97 *(2.949)*	230 *(110.1)*	59 *(14.8)*	76 *(24.7)*	28.875 *(97.507)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	56.63 *(42.23)*	2308	3.900 *(14.762)*	0.486 *(0.296)*	14.52 *(2.860)*	216 *(102.2)*	59 *(15.0)*	79 *(26.1)*	....
	0.00 *(0.00)*	2407	1.143 *(4.326)*	....	....	183 *(83.9)*	59 *(15.0)*	80 *(26.7)*	....
	29.07 *(21.67)*	2368	2.396 *(9.070)*	0.582 *(0.354)*	12.13 *(2.390)*	190 *(87.5)*	59 *(15.0)*	82 *(28.1)*	....
	63.67 *(47.48)*	2200	4.605 *(17.432)*	0.511 *(0.311)*	13.83 *(2.724)*	226 *(107.8)*	59 *(15.0)*	84 *(28.6)*	....
	14.66 *(10.93)*	2388	1.784 *(6.754)*	0.860 *(0.523)*	8.21 *(1.618)*	186 *(85.8)*	59 *(15.0)*	84 *(28.9)*	....
	43.01 *(32.07)*	2336	3.037 *(11.498)*	0.499 *(0.303)*	14.16 *(2.790)*	195 *(90.6)*	58 *(14.7)*	84 *(29.2)*	....
Av ***Av***	**34.51** ***(25.73)***	**2335**	**2.811** ***(10.640)***	**0.575** ***(0.350)***	**12.28** ***(2.418)***	**199** ***(93.0)***	**59** ***(15.0)***	**82** ***(27.9)***	**28.863** ***(97.467)***

DRAWBAR PERFORMANCE (Front Wheel Drive Disengaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption			Temp. °F *(°C)*			
					gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 4th (M-1) Gear											
51.49 *(38.40)*	4339 *(19.30)*	4.45 *(7.16)*	2200	8.87	4.549 *(17.220)*	0.624 *(0.379)*	11.32 *(2.230)*	217 *(102.5)*	46 *(7.5)*	60 *(15.3)*	28.840 *(97.388)*
75% of Pull at Maximum Power—Ten Hours 4th (M-1) Gear											
42.48 *(31.68)*	3347 *(14.89)*	4.76 *(7.66)*	2294	6.57	3.639 *(13.776)*	0.605 *(0.368)*	11.67 *(2.299)*	192 *(89.0)*	47 *(8.6)*	61 *(16.2)*	28.884 *(97.537)*
50% of Pull at Maximum Power—Two Hours 4th (M-1) Gear											
29.88 *(22.28)*	2239 *(9.96)*	5.00 *(8.05)*	2361	4.60	2.850 *(10.788)*	0.674 *(0.410)*	10.48 *(2.065)*	187 *(85.8)*	45 *(7.2)*	62 *(16.4)*	28.790 *(97.220)*
50% of Pull at Reduced Engine Speed—Two Hours 6th (M-3) Gear											
29.52 *(22.02)*	2212 *(9.84)*	5.01 *(8.06)*	1375	4.67	2.089 *(7.906)*	0.500 *(0.304)*	14.13 *(2.784)*	186 *(85.6)*	44 *(6.4)*	50 *(10.0)*	28.960 *(97.794)*
MAXIMUM POWER IN SELECTED GEARS											
47.88 *(35.71)*	7224 *(32.13)*	2.49 *(4.00)*	2263	14.93	2nd (L-2) Gear			192 *(88.9)*	43 *(6.1)*	48 *(8.9)*	28.950 *(97.760)*
51.74 *(38.58)*	5867 *(26.10)*	3.31 *(5.32)*	2200	12.28	3rd (L-3) Gear			208 *(97.8)*	43 *(6.1)*	56 *(13.3)*	28.880 *(97.523)*
52.92 *(39.46)*	4454 *(19.81)*	4.46 *(7.17)*	2200	8.84	4th (M-1) Gear			209 *(98.1)*	41 *(5.0)*	52 *(11.1)*	28.870 *(97.490)*
53.27 *(39.72)*	3377 *(15.02)*	5.91 *(9.52)*	2198	6.58	5th (M-2) Gear			205 *(96.1)*	43 *(6.1)*	56 *(13.3)*	28.880 *(97.523)*
51.99 *(38.77)*	2440 *(10.85)*	7.99 *(12.86)*	2199	4.91	6th (M-3) Gear			202 *(94.4)*	44 *(6.7)*	57 *(13.9)*	28.880 *(97.523)*

Department of Agricultural Engineering

Dates of Test: April 18-26, 1980

Manufacturer: LEYLAND VEHICLES LIMITED MLVD Blackburn Road, Bathgate, West Lothian, Scotland.

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 20-20W **API service classification** SB/SE-CA/CC **To motor** 2.368 gal *(8.963 l)* **Drained from motor** 2.008 gal *(7.600 l)* **Transmission and final drive lubricant** SAE 20W30 **Total time engine was operated** 40.0 hours

ENGINE: Make Leyland Dsl **Type** Four cylinder vertical **Serial No.** 498NT/1560/75001 **Crankshaft** lengthwise **Rated rpm** 2200 **Bore and stroke** 3.858" × 4.921" *(98 mm × 125 mm)* **Compression ratio** 16.8 to 1 **Displacement** 230 cu in *(3771 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element **Oil filter** one full flow cartridge **Fuel filter** one paper cartridge and two gauze screens **Muffler** vertical **Cooling medium temperature control** one thermostat.

CHASSIS: Type Front wheel assist **Serial No.** 247466 **Tread width** rear 60" *(1520 mm)* to 80" *(2032 mm)* front 61" *(1549 mm)* to 73" *(1854 mm)* **Wheel base** 83.28 *(2115 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 32.9" *(835 mm)* Vertical distance above roadway 33.8" *(858 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph** *(km/h)* first 2.2 *(3.6)* second 2.9 *(4.6)* third 3.8 *(6.1)* fourth 5.0 *(8.0)* fifth 6.4 *(10.3)* sixth 8.5 *(13.7)* seventh 11.8 *(19.0)* eighth 15.3 *(24.6)* ninth 20.3 *(32.7)* reverse 3.3 *(5.2)*, 7.3 *(11.7)*, 17.3 *(27.8)* **Clutch** double dry disc hydraulically operated by foot pedal **Brakes** multiple dry disc hydraulically operated by two foot pedals which can be locked together and hand lever **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 176" *(4.47 m)* left 172" *(4.37 m)* (on concrete surface without brake) right 211" *(5.36 m)* left 208" *(5.29 m)* **Turning space diameter** (on concrete surface with brake applied) right 352" *(8.94 m)* left 344" *(8.74 m)* (on concrete surface without brake) right 422" *(10.71 m)* left 417" *(10.59 m)* **Power take-off** 540 rpm at 1813 engine rpm.

LUGGING ABILITY IN 4th (M-1) GEAR

Crankshaft Speed rpm	2200	1977	1756	1545	1313	1098
Pull—lbs	4454	4828	5170	5339	5404	5147
(kN)	*(19.81)*	*(21.48)*	*(23.00)*	*(23.75)*	*(24.04)*	*(22.89)*
Increase in Pull %	0	8	16	20	21	16
Power—Hp	52.92	51.10	48.18	43.54	37.41	29.96
(kW)	*(39.46)*	*(38.10)*	*(35.93)*	*(32.47)*	*(27.90)*	*(22.34)*
Speed—Mph	4.46	3.97	3.49	3.06	2.60	2.18
(km/h)	*(7.17)*	*(6.39)*	*(5.62)*	*(4.92)*	*(4.18)*	*(3.51)*
Slip %	8.84	9.58	10.44	10.80	10.92	10.44

TRACTOR SOUND LEVEL WITH CAB	dB(A)	Front Wheel Drive Disengaged dB(A)
Maximum Available Power—Two Hours	85.5	84.5
75% of Pull at Maximum Power—Ten Hours	-	91.0
50% of Pull at Maximum Power—Two Hours	-	85.5
50% of Pull at Reduced Engine Speed—Two Hours	-	80.0
Bystander in 8th (H-2) gear	-	87.5

DRAWBAR PERFORMANCE
(Front Wheel Engaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 4th (M-1) Gear											
51.22 *(38.20)*	4092 *(18.20)*	4.69 *(7.55)*	2200	5.86	4.514 *(17.086)*	0.622 *(0.379)*	11.35 *(2.236)*	221 *(105.0)*	45 *(7.2)*	60 *(15.6)*	28.795 *(97.236)*
MAXIMUM POWER IN SELECTED GEARS											
49.05 *(36.57)*	9458 *(42.07)*	1.94 *(3.13)*	2247	14.73	1st (L-1) Gear			195 *(90.6)*	43 *(6.1)*	48 *(8.9)*	28.950 *(97.760)*
52.94 *(39.48)*	5610 *(24.96)*	3.54 *(5.69)*	2199	7.90	3rd (L-3) Gear			213 *(100.3)*	43 *(6.1)*	56 *(13.3)*	28.880 *(97.523)*
52.65 *(39.26)*	4203 *(18.69)*	4.70 *(7.56)*	2200	5.62	4th (M-1) Gear			213 *(100.6)*	42 *(5.6)*	54 *(12.2)*	28.870 *(97.490)*

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 16.9-34; 8; 16 *(110)*	Two 16.9-34; 8; 16 *(110)*
Ballast	—Liquid (each)	900 lb *(408 kg)*	None
	—Cast Iron (each)	460 lb *(209 kg)*	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 12.4/11-28; 6; 20 *(140)*	Two 12.4/11-28; 6; 20 *(140)*
Ballast	—Liquid (each)	400 lb *(182 kg)*	None
	—Cast Iron (each)	530 lb *(240 kg)*	None
Height of Drawbar		18.5 in *(470 mm)*	18.5 in *(470 mm)*
Static Weight with Operator	—Rear	7210 lb *(3270 kg)*	4490 lb *(2037 kg)*
	—Front	4780 lb *(2168 kg)*	2920 lb *(1324 kg)*
	—Total	11990 lb *(5438 kg)*	7410 lb *(3361 kg)*

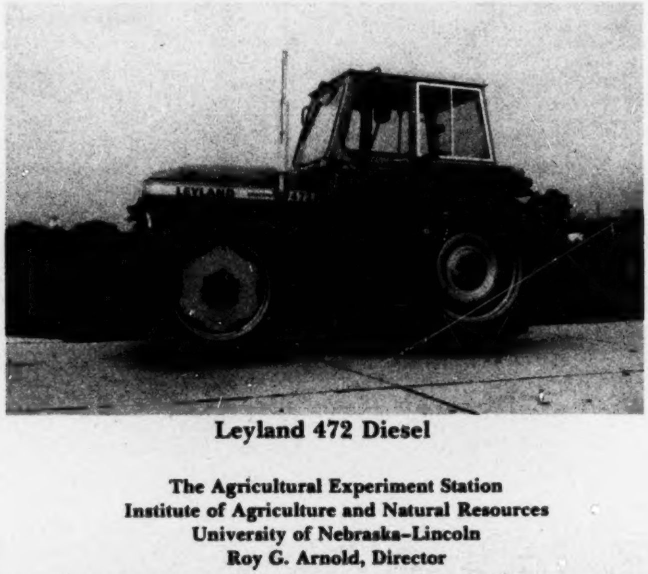
REPAIRS and ADJUSTMENTS: The PTO clutch linkage required adjustment during the varying load PTO test.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 158°F *(70.0°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1341**.

LOUIS I. LEVITICUS
Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers



Leyland 472 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1342 — MASSEY FERGUSON 4800 DIESEL
18 SPEED—ALSO 12 SPEED

POWER TAKE-OFF PERFORMANCE

Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption			Temperature °F *(°C)*			Barometer inch Hg *(kPa)*
		gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cooling medium	Air wet bulb	Air dry bulb	
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1107 rpm)								
179.31 *(133.71)*	2600	12.683 *(48.012)*	0.500 *(0.304)*	14.14 *(2.785)*	182 *(83.2)*	55 *(12.8)*	75 *(23.8)*	28.930 *(97.692)*
Standard Power Take-Off Speed (1000 rpm)—One Hour								
172.88 *(128.92)*	2348	11.447 *(43.332)*	0.468 *(0.284)*	15.10 *(2.975)*	182 *(83.3)*	55 *(12.7)*	75 *(23.9)*	28.940 *(97.726)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
158.95 *(118.53)*	2713	12.222 *(46.264)*	0.543 *(0.330)*	13.01 *(2.562)*	181 *(82.8)*	55 *(12.8)*	76 *(24.4)*	....
0.00 *(0.00)*	2800	5.833 *(22.079)*	....	....	168 *(75.8)*	54 *(12.2)*	76 *(24.4)*	....
80.78 *(60.24)*	2757	8.840 *(33.464)*	0.773 *(0.470)*	9.14 *(1.800)*	177 *(80.6)*	54 *(12.2)*	76 *(24.4)*	....
179.49 *(133.85)*	2600	12.664 *(47.937)*	0.498 *(0.303)*	14.17 *(2.792)*	182 *(83.3)*	55 *(12.8)*	77 *(25.0)*	....
40.77 *(30.40)*	2773	7.311 *(27.675)*	1.266 *(0.770)*	5.58 *(1.099)*	170 *(76.9)*	55 *(12.8)*	78 *(25.6)*	....
120.43 *(89.81)*	2736	10.459 *(39.591)*	0.613 *(0.373)*	11.52 *(2.268)*	180 *(82.2)*	55 *(12.8)*	78 *(25.6)*	....
Av 96.74 ***Av (72.14)***	**2730**	**9.555** ***(36.168)***	**0.697** ***(0.424)***	**10.12** ***(1.995)***	**176** ***(80.3)***	**55** ***(12.6)***	**77** ***(24.9)***	**28.860** ***(97.456)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption			Temp. °F *(°C)*			Barom. inch Hg *(kPa)*
					gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cool-ing med	Air wet bulb	Air dry bulb	
Maximum Available Power—Two Hours 7th (2Lo Lo) Gear											
153.78 *(114.68)*	11958 *(53.19)*	4.82 *(7.76)*	2600	3.30	12.673 *(47.974)*	0.582 *(0.354)*	12.13 *(2.390)*	178 *(81.1)*	55 *(12.8)*	69 *(20.3)*	28.785 *(97.203)*
75% of Pull at Maximum Power—Ten Hours 7th (2Lo Lo) Gear											
126.43 *(94.28)*	9289 *(41.32)*	5.10 *(8.21)*	2730	2.36	11.778 *(44.584)*	0.658 *(0.400)*	10.73 *(2.115)*	175 *(79.6)*	49 *(9.3)*	67 *(19.5)*	28.753 *(97.095)*
50% of Pull at Maximum Power—Two Hours 7th (2Lo Lo) Gear											
85.84 *(64.01)*	6177 *(27.48)*	5.21 *(8.39)*	2765	1.65	10.231 *(38.728)*	0.842 *(0.512)*	8.39 *(1.653)*	156 *(68.9)*	50 *(10.0)*	57 *(13.6)*	28.800 *(97.253)*
50% of Pull at Reduced Engine Speed—Two Hours 11th (2Hi Int) Gear											
86.10 *(64.20)*	6183 *(27.50)*	5.22 *(8.40)*	1737	1.48	6.655 *(25.193)*	0.546 *(0.332)*	12.94 *(2.548)*	171 *(77.2)*	55 *(12.5)*	65 *(18.3)*	28.810 *(97.287)*
MAXIMUM POWER IN SELECTED GEARS											
146.60 *(109.32)*	25294 *(112.51)*	2.17 *(3.50)*	2602	11.64	1st (1Lo Lo) Gear			179 *(81.4)*	50 *(10.0)*	70 *(21.1)*	28.880 *(97.523)*
153.50 *(114.47)*	21031 *(93.55)*	2.74 *(4.40)*	2600	7.04	2nd (1Lo Int) Gear			179 *(81.4)*	50 *(10.0)*	69 *(20.6)*	28.890 *(97.557)*
155.92 *(116.27)*	19051 *(84.74)*	3.07 *(4.94)*	2599	5.85	3rd (1Hi Lo) Gear			180 *(81.9)*	50 *(10.0)*	69 *(20.6)*	28.890 *(97.557)*
155.75 *(116.14)*	18688 *(83.13)*	3.13 *(5.03)*	2600	5.70	4th (1Lo Hi) Gear			179 *(81.4)*	50 *(10.0)*	69 *(20.6)*	28.900 *(97.591)*
158.29 *(118.04)*	15894 *(70.70)*	3.73 *(6.01)*	2598	4.55	5th (1Hi Int) Gear			179 *(81.7)*	50 *(10.0)*	69 *(20.6)*	28.900 *(97.591)*
157.74 *(117.63)*	13971 *(62.15)*	4.23 *(6.81)*	2600	3.93	6th (1Hi Hi) Gear			179 *(81.7)*	49 *(9.4)*	68 *(20.0)*	28.910 *(97.625)*
159.08 *(118.63)*	12383 *(55.08)*	4.82 *(7.75)*	2601	3.38	7th (2Lo Lo) Gear			179 *(81.4)*	48 *(8.9)*	64 *(17.8)*	28.910 *(97.625)*
155.47 *(115.93)*	10030 *(44.62)*	5.81 *(9.35)*	2599	2.74	8th (2Lo Int) Gear			180 *(81.9)*	51 *(10.6)*	72 *(22.2)*	28.880 *(97.523)*
157.23 *(117.25)*	9123 *(40.58)*	6.46 *(10.40)*	2600	2.42	9th (2Hi Lo) Gear			180 *(81.9)*	51 *(10.6)*	72 *(22.2)*	28.870 *(97.490)*
156.87 *(116.98)*	8952 *(39.82)*	6.57 *(10.58)*	2601	2.26	10th (2Lo Hi) Gear			179 *(81.7)*	52 *(11.1)*	73 *(22.8)*	28.870 *(97.490)*
153.79 *(114.68)*	7396 *(32.90)*	7.80 *(12.55)*	2601	1.77	11th (2Hi Int) Gear			179 *(81.4)*	52 *(11.1)*	73 *(22.8)*	28.860 *(97.456)*
148.68 *(110.87)*	6337 *(28.19)*	8.80 *(14.15)*	2600	1.36	12th (2Hi Hi) Gear			180 *(82.2)*	53 *(11.7)*	74 *(23.3)*	28.860 *(97.456)*

Department of Agricultural Engineering

Dates of Test: April 17—May 3, 1980

Manufacturer: MASSEY FERGUSON, INC.,
1901 Bell Avenue, Des Moines, Iowa 50315

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE 30 API service classification** SB/SE-CA/CD **To motor** 7.083 gal *(26.810 l)* **Drained from motor** 6.043 gal *(22.874 l)* **Transmission, hydraulic, and final drive lubricant** MF Permatran **Total time engine was operated** 48.5 hours.

ENGINE Make Cummins Dsl **Type** eight cylinder vee **Serial No.** 10895047 **Crankshaft** lengthwise **Rated rpm** 2600 **Bore and stroke** 5.5" × 4.75" *(139.7 mm × 120.7 mm)* **Compression ratio** 15.5 to 1 **Displacement** 903 cu in *(14800 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge and one bypass cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** vertical **Cooling medium temperature control** two thermostats.

CHASSIS: Type four wheel drive with duals **Serial No.** 9D 002156 **Tread width** rear 70" *(1778 mm)* to 126.5" *(3210 mm)* front 70" *(1778 mm)* to 126.5" *(3210 mm)* **Wheel base** 137" *(3480 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 83.8" *(2129 mm)* Vertical distance above roadway 49.1" *(1247 mm)* Horizontal distance from center of rear wheel tread 0.4" *(10 mm)* to the right **Hydraulic control system** direct engine drive **Transmission** Selective gear fixed ratio with partial (3) range operator controlled powershift **Advertised speeds mph** ***(km/h)*** first 2.4 *(3.8)* second 2.9 *(4.6)* third 3.2 *(5.1)* fourth 3.2 *(5.2)* fifth 3.8 *(6.1)* sixth 4.3 *(6.9)* seventh 4.8 *(7.8)* eighth 5.8 *(9.3)* ninth 6.4 *(10.3)* tenth 6.5 *(10.5)* eleventh 7.7 *(12.4)* twelfth 8.7 *(14.0)* thirteenth 10.7 *(17.2)* fourteenth 12.8 *(20.6)* fifteenth 14.2 *(22.9)* sixteenth 14.4 *(23.2)* seventeenth 17.0 *(27.4)* eighteenth 19.2 *(30.9)* reverse 3.2 *(5.2)*, 3.9 *(6.3)*, 4.3 *(7.0)*, 4.4 *(7.1)*, 5.2 *(8.3)*, 5.8 *(9.4)* **Clutch** multiple wet disc operated by foot pedal **Brakes** caliper disc hydraulically operated by foot pedal or mechanically by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 246" *(6.25 m)* left 246" *(6.25 m)* **Turning space diameter** (on concrete surface without brake) right 516" *(13.10 m)* left 516" *(13.10 m)* **Power take-off** 1000 rpm at 2348 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 139°F *(59.5°C)*. Twelve gears were chosen up to 10 mph *(16.1 km/h)*.

LUGGING ABILITY IN 7th (2Lo Lo) GEAR

Crankshaft Speed rpm	2601	2352	2078	1814	1558	1299	1032	792
Pull—lbs *(kN)*	12383 *(55.08)*	13157 *(58.52)*	14595 *(64.92)*	15951 *(70.96)*	17305 *(76.97)*	18152 *(80.74)*	19164 *(85.25)*	18868 *(83.93)*
Increase in Pull %	0	6	18	29	40	47	55	52
Power—Hp *(kW)*	159.08 *(118.63)*	152.40 *(113.64)*	148.66 *(110.85)*	141.13 *(105.24)*	130.80 *(97.54)*	113.95 *(84.97)*	95.16 *(70.96)*	71.85 *(53.58)*
Speed—Mph *(km/h)*	4.82 *(7.75)*	4.34 *(6.99)*	3.82 *(6.15)*	3.32 *(5.34)*	2.83 *(4.56)*	2.35 *(3.79)*	1.86 *(3.00)*	1.43 *(2.30)*
Slip %	3.38	3.54	4.17	4.48	5.09	5.40	5.85	5.85

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	82.0
75% of Pull at Maximum Power—Ten Hours	81.5
50% of Pull at Maximum Power—Two Hours	81.5
50% of Pull at Reduced Engine Speed—Two Hours	80.0
Bystander in 15th (3Hi Lo) gear	94.0

TIRES, BALLAST AND WEIGHT	Tested Without Ballast
Rear Tires—No., size, ply & psi *(kPa)*	Inner Two 23.1-34; 8; 16 *(110)* Outer Two 18.4-38; 8; 12 *(85)*
Ballast—Liquid (each)	None
—Cast Iron (each)	None
Front Tires—No., size, ply & psi *(kPa)*	Inner Two 23.1-34; 8; 16 *(110)* Outer Two 18.4-38; 8; 12 *(85)*
Ballast—Liquid (each)	None
—Cast Iron (each)	None
Height of drawbar	21.5 in *(545 mm)*
Static Weight with Operator—Rear	11950 lb *(5421 kg)*
—Front	18570 lb *(8423 kg)*
—Total	30520 lb *(13844 kg)*

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1342**.

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

Massey Ferguson 4800 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1343 — MASSEY FERGUSON 4840 DIESEL 18 SPEED-ALSO 12 SPEED

POWER TAKE-OFF PERFORMANCE

Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F (°C) Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1108 rpm)								
210.67 *(157.10)*	2600	14.541 *(55.044)*	0.487 *(0.297)*	14.49 *(2.854)*	184 *(84.3)*	52 *(11.3)*	75 *(23.8)*	28.830 *(97.355)*
Standard Power Take-Off Speed (1000 rpm)—One Hour								
210.61 *(157.05)*	2348	13.526 *(51.201)*	0.454 *(0.276)*	15.57 *(3.067)*	185 *(84.9)*	52 *(11.1)*	75 *(24.0)*	28.815 *(97.304)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
185.51 *(138.34)*	2695	13.738 *(52.005)*	0.523 *(0.318)*	13.50 *(2.660)*	180 *(82.2)*	52 *(11.4)*	76 *(24.2)*	....
0.00 *(0.00)*	2760	5.790 *(21.918)*	....	....	171 *(77.2)*	52 *(11.1)*	75 *(23.9)*	....
94.51 *(70.48)*	2741	9.626 *(36.439)*	0.719 *(0.438)*	9.82 *(1.934)*	174 *(79.2)*	52 *(11.1)*	75 *(23.9)*	....
210.69 *(157.11)*	2600	14.554 *(55.093)*	0.488 *(0.297)*	14.48 *(2.852)*	184 *(84.2)*	52 *(11.1)*	75 *(23.9)*	....
47.46 *(35.39)*	2752	7.723 *(29.235)*	1.149 *(0.699)*	6.15 *(1.211)*	172 *(77.8)*	52 *(11.1)*	75 *(23.9)*	....
140.58 *(104.83)*	2723	11.593 *(43.884)*	0.582 *(0.354)*	12.13 *(2.389)*	176 *(80.0)*	52 *(11.1)*	75 *(23.9)*	....
Av 113.13 ***Av (84.36)***	**2712**	**10.504** ***(39.762)***	**0.656** ***(0.399)***	**10.77** ***(2.122)***	**176** ***(80.1)***	**52** ***(11.2)***	**75** ***(23.9)***	**28.800** ***(97.253)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 7th (2Lo Lo) Gear											
179.65 *(133.96)*	13921 *(61.92)*	4.84 *(7.79)*	2598	4.01	14.479 *(54.809)*	0.569 *(0.346)*	12.41 *(2.444)*	179 *(81.7)*	56 *(13.3)*	71 *(21.4)*	28.915 *(97.642)*
75% of Pull at Maximum Power—Ten Hours 7th (2Lo Lo) Gear											
147.47 *(109.97)*	10823 *(48.14)*	5.11 *(8.22)*	2713	2.95	13.109 *(49.623)*	0.628 *(0.382)*	11.25 *(2.216)*	174 *(79.1)*	56 *(13.6)*	73 *(22.8)*	28.954 *(97.773)*
50% of Pull at Maximum Power—Two Hours 7th (2Lo Lo) Gear											
100.63 *(75.04)*	7234 *(32.18)*	5.22 *(8.40)*	2743	2.03	10.797 *(40.872)*	0.758 *(0.461)*	9.32 *(1.836)*	172 *(77.5)*	57 *(13.9)*	72 *(22.2)*	28.995 *(97.912)*
50% of Pull at Reduced Engine Speed—Two Hours 11th (2Hi Int) Gear											
101.41 *(75.62)*	7266 *(32.32)*	5.23 *(8.42)*	1726	1.91	7.346 *(27.806)*	0.512 *(0.311)*	13.81 *(2.720)*	172 *(77.5)*	58 *(14.2)*	78 *(25.6)*	29.000 *(97.929)*
MAXIMUM POWER IN SELECTED GEARS											
162.45 *(121.14)*	28191 *(125.40)*	2.16 *(3.48)*	2651	14.86	1st (1Lo Lo) Gear			173 *(78.1)*	55 *(12.8)*	65 *(18.3)*	28.980 *(97.861)*
176.06 *(131.29)*	24476 *(108.88)*	2.70 *(4.34)*	2600	9.64	2nd (1Lo Int) Gear			177 *(80.6)*	55 *(12.8)*	67 *(19.4)*	28.950 *(97.760)*
181.65 *(135.46)*	22271 *(99.06)*	3.06 *(4.92)*	2600	7.56	3rd (1Hi Lo) Gear			176 *(80.0)*	55 *(12.8)*	67 *(19.4)*	28.960 *(97.794)*
183.46 *(136.81)*	22119 *(98.39)*	3.11 *(5.01)*	2600	7.33	4th (1Lo Hi) Gear			176 *(80.0)*	55 *(12.8)*	66 *(18.9)*	28.960 *(97.794)*
183.06 *(136.50)*	18333 *(81.55)*	3.74 *(6.03)*	2596	5.53	5th (1Hi Int) Gear			176 *(80.0)*	55 *(12.8)*	66 *(18.9)*	28.950 *(97.760)*
185.01 *(137.96)*	16318 *(72.58)*	4.25 *(6.84)*	2599	4.68	6th (1Hi Hi) Gear			177 *(80.3)*	54 *(12.2)*	65 *(18.3)*	28.940 *(97.726)*
186.36 *(138.97)*	14440 *(64.23)*	4.84 *(7.79)*	2599	4.05	7th (2Lo Lo) Gear			180 *(82.2)*	57 *(13.9)*	72 *(22.2)*	28.910 *(97.625)*
183.76 *(137.03)*	11779 *(52.40)*	5.85 *(9.41)*	2598	3.17	8th (2Lo Int) Gear			178 *(81.1)*	55 *(12.8)*	68 *(20.0)*	28.950 *(97.760)*
183.94 *(137.16)*	10596 *(47.13)*	6.51 *(10.48)*	2598	2.85	9th (2Hi Lo) Gear			177 *(80.3)*	55 *(12.8)*	68 *(20.0)*	28.940 *(97.726)*
181.65 *(135.46)*	10288 *(45.76)*	6.62 *(10.66)*	2601	2.77	10th (2Lo Hi) Gear			178 *(81.1)*	55 *(12.8)*	69 *(20.6)*	28.940 *(97.726)*
179.09 *(133.55)*	8548 *(38.02)*	7.86 *(12.64)*	2600	2.28	11th (2Hi Int) Gear			178 *(81.1)*	55 *(12.8)*	69 *(20.6)*	28.930 *(97.692)*
180.43 *(134.54)*	7633 *(33.95)*	8.86 *(14.27)*	2599	2.03	12th (2Hi Hi) Gear			178 *(80.8)*	55 *(12.8)*	69 *(20.6)*	28.930 *(97.692)*

Department of Agricultural Engineering

Dates of Test: April 16—May 6, 1980

Manufacturer: MASSEY FERGUSON, INC., 1901 Bell Avenue, Des Moines, Iowa 50315

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 30 **API service classification** SB/SE-CA/CD **To motor** 7.261 gal *(27.481 l)* **Drained from motor** 6.374 gal *(24.126 l)* **Transmission, hydraulic, and final drive lubricant** MF Permatran **Total time engine was operated** 43.5 hours.

ENGINE Make Cummins Dsl **Type** eight cylinder vee **Serial No.** 10891424 **Crankshaft** lengthwise **Rated rpm** 2600 **Bore and stroke** 5.5" × 4.75" *(139.7 mm × 120.7 mm)* **Compression ratio** 15.5 to 1 **Displacement** 903 cu in *(14800 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge and one bypass cartridge **Oil cooler** engine coolant heat exchanger for crankcase, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** vertical **Cooling medium temperature control** two thermostats

CHASSIS: Type four wheel drive with duals **Serial No.** 9D 002144 **Tread width** rear 70.0" *(1778 mm)* to 130.5" *(3314 mm)* front 70.0" *(1778 mm)* to 130.5" *(3314 mm)* **Wheel base** 137" *(3480 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 84.1" *(2136 mm)* Vertical distance above roadway 49.1" *(1247 mm)* Horizontal distance from center of rear wheel tread 0.3" *(8 mm)* to the right **Hydraulic control system** direct engine drive **Transmission** Selective gear fixed ratio with partial (3) range operator controlled power shift **Advertised speeds mph** ***(km/h)*** first 2.4 *(3.8)* second 2.9 *(4.6)* third 3.2 *(5.1)* fourth 3.2 *(5.2)* fifth 3.8 *(6.1)* sixth 4.3 *(6.9)* seventh 4.8 *(7.8)* eighth 5.8 *(9.3)* ninth 6.4 *(10.3)* tenth 6.5 *(10.5)* eleventh 7.7 *(12.4)* twelfth 8.7 *(14.0)* thirteenth 10.7 *(17.2)* fourteenth 12.8 *(20.6)* fifteenth 14.2 *(22.9)* sixteenth 14.4 *(23.2)* seventeenth 17.0 *(27.4)* eighteenth 19.2 *(30.9)* reverse 3.2 *(5.2)*, 3.9 *(6.3)*, 4.3 *(7.0)*, 4.4 *(7.1)*, 5.2 *(8.3)*, 5.8 *(9.4)* **Clutch** multiple wet disc operated by foot pedal **Brakes** caliper disc hydraulically operated by foot pedal or mechanically by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 246" *(6.25 m)* left 246" *(6.25 m)* **Turning space diameter** (on concrete surface without brake) right 516" *(13.10 m)* left 516" *(13.10 m)* **Power take-off** 1000 rpm at 2348 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 138°F *(59.1°C)*. Twelve gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

LUGGING ABILITY IN 7th (2Lo Lo) GEAR

Crankshaft Speed rpm	2599	2351	2082	1814	1562	1294	1028
Pull—lbs *(kN)*	14440 *(64.23)*	15763 *(70.12)*	17949 *(79.84)*	19503 *(86.75)*	20411 *(90.79)*	21662 *(96.36)*	21614 *(96.14)*
Increase in Pull %	0	9	24	35	41	50	50
Power—Hp *(kW)*	186.36 *(138.97)*	183.28 *(136.67)*	183.27 *(136.67)*	172.28 *(128.47)*	154.59 *(115.28)*	134.82 *(100.53)*	106.88 *(79.70)*
Speed—Mph *(km/h)*	4.84 *(7.79)*	4.36 *(7.02)*	3.83 *(6.16)*	3.31 *(5.33)*	2.84 *(4.57)*	2.33 *(3.76)*	1.85 *(2.98)*
Slip %	4.05	4.44	5.22	5.84	6.44	7.04	7.04

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	84.5
75% of Pull at Maximum Power—Ten Hours	86.0
50% of Pull at Maximum Power—Two Hours	86.5
50% of Pull at Reduced Engine Speed—Two Hours	80.0
Bystander in 15th (3Hi Lo) gear	95.5

TIRES, BALLAST AND WEIGHT	Tested Without Ballast
Rear Tires—No., size, ply & psi *(kPa)*	Four 23.1-34; 8; inner 16 *(110)* outer 12 *(85)*
Ballast—Liquid (each)	None
—Cast Iron (each)	None
Front Tires—No., size, ply & psi *(kPa)*	Four 23.1-34; 8; inner 16 *(110)* outer 12 *(85)*
Ballast—Liquid (each)	None
—Cast Iron (each)	None
Height of drawbar	21.5 in *(545 mm)*
Static Weight with Operator—Rear	12180 lb *(5525 kg)*
Front	18740 lb *(8500 kg)*
Total	30920 lb *(14025 kg)*

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1343.**

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

Massey Ferguson 4840 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1344 — MASSEY FERGUSON 4880 DIESEL 18 SPEED—ALSO 12 SPEED

POWER TAKE-OFF PERFORMANCE

Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1108 rpm)								
272.81 *(203.43)*	2600	17.349 *(65.674)*	0.449 *(0.273)*	15.72 *(3.098)*	184 *(84.3)*	54 *(12.2)*	75 *(23.9)*	28.927 *(97.681)*
Standard Power Take-Off Speed (1000 rpm)—One Hour								
267.38 *(199.39)*	2348	15.916 *(60.249)*	0.420 *(0.256)*	16.80 *(3.309)*	183 *(83.8)*	54 *(12.1)*	75 *(23.8)*	28.900 *(97.591)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
242.56 *(180.88)*	2721	16.767 *(63.471)*	0.488 *(0.297)*	14.47 *(2.850)*	182 *(83.6)*	54 *(12.2)*	75 *(23.9)*	....
0.00 *(0.00)*	2799	6.805 *(25.761)*	....	....	176 *(80.0)*	54 *(11.9)*	74 *(23.6)*	....
123.83 *(92.34)*	2774	12.141 *(45.959)*	0.692 *(0.421)*	10.20 *(2.009)*	180 *(81.9)*	54 *(12.2)*	75 *(23.9)*	....
273.97 *(204.30)*	2600	17.345 *(65.658)*	0.447 *(0.272)*	15.80 *(3.112)*	184 *(84.4)*	54 *(12.2)*	75 *(23.9)*	....
62.18 *(46.36)*	2787	9.528 *(36.069)*	1.082 *(0.658)*	6.53 *(1.285)*	177 *(80.6)*	53 *(11.7)*	75 *(23.9)*	....
184.56 *(137.63)*	2758	14.499 *(54.884)*	0.555 *(0.337)*	12.73 *(2.508)*	180 *(82.2)*	54 *(11.9)*	75 *(23.9)*	....
Av 147.85 ***Av (110.25)***	**2740**	**12.848** ***(48.634)***	**0.614** ***(0.373)***	**11.51** ***(2.267)***	**180** ***(82.1)***	**54** ***(12.0)***	**75** ***(23.8)***	**28.875** ***(97.507)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 8th (2Lo Int) Gear											
235.40 *(175.54)*	15271 *(67.93)*	5.78 *(9.30)*	2599	4.40	17.435 *(65.998)*	0.523 *(0.318)*	13.50 *(2.660)*	185 *(85.0)*	61 *(16.1)*	85 *(29.4)*	28.788 *(97.211)*
75% of Pull at Maximum Power—Ten Hours 8th (2Lo Int) Gear											
194.65 *(145.15)*	11822 *(52.59)*	6.17 *(9.94)*	2742	3.16	16.249 *(61.509)*	0.590 *(0.359)*	11.98 *(2.360)*	175 *(79.3)*	57 *(12.4)*	74 *(23.2)*	28.799 *(97.250)*
50% of Pull at Maximum Power—Two Hours 8th (2Lo Int) Gear											
131.99 *(98.42)*	7827 *(34.81)*	6.32 *(10.18)*	2785	2.36	13.771 *(52.128)*	0.737 *(0.448)*	9.58 *(1.888)*	174 *(78.9)*	42 *(5.3)*	54 *(12.2)*	28.995 *(97.912)*
50% of Pull at Reduced Engine Speed—Two Hours 13th (3Lo Lo) Gear											
132.73 *(98.97)*	7869 *(35.00)*	6.33 *(10.18)*	1507	2.28	8.815 *(33.368)*	0.469 *(0.285)*	15.06 *(2.966)*	174 *(78.9)*	43 *(6.1)*	57 *(13.9)*	28.985 *(97.878)*
MAXIMUM POWER IN SELECTED GEARS											
204.40 *(152.42)*	29272 *(130.21)*	2.62 *(4.21)*	2679	14.80	2nd (1Lo Int) Gear			175 *(79.4)*	37 *(2.8)*	46 *(7.8)*	28.960 *(97.794)*
219.66 *(163.80)*	28494 *(126.75)*	2.89 *(4.65)*	2600	12.49	3rd (1Hi Lo) Gear			175 *(79.2)*	39 *(3.9)*	49 *(9.4)*	28.980 *(97.861)*
219.92 *(163.99)*	27685 *(123.15)*	2.98 *(4.79)*	2599	11.15	4th (1Lo Hi) Gear			174 *(78.9)*	38 *(3.3)*	47 *(8.3)*	28.970 *(97.827)*
232.14 *(173.10)*	24025 *(106.87)*	3.62 *(5.83)*	2599	8.57	5th (1Hi Int) Gear			180 *(81.9)*	57 *(13.9)*	70 *(21.1)*	28.860 *(97.456)*
236.86 *(176.63)*	21361 *(95.02)*	4.16 *(6.69)*	2600	6.82	6th (1Hi Hi) Gear			179 *(81.4)*	58 *(14.4)*	73 *(22.8)*	28.860 *(97.456)*
236.52 *(176.37)*	18614 *(82.80)*	4.76 *(7.67)*	2602	5.53	7th (2Lo Lo) Gear			178 *(81.1)*	57 *(13.9)*	68 *(20.0)*	28.860 *(97.456)*
242.21 *(180.61)*	15733 *(69.99)*	5.77 *(9.29)*	2600	4.44	8th (2Lo Int) Gear			180 *(82.2)*	58 *(14.4)*	72 *(22.2)*	28.860 *(97.456)*
238.54 *(177.88)*	13884 *(61.76)*	6.44 *(10.37)*	2600	3.81	9th (2Hi Lo) Gear			183 *(83.9)*	60 *(15.6)*	80 *(26.7)*	28.840 *(97.388)*
244.57 *(182.37)*	14022 *(62.37)*	6.54 *(10.53)*	2598	3.81	10th (2Lo Hi) Gear			183 *(83.6)*	60 *(15.6)*	81 *(27.2)*	28.840 *(97.388)*
240.55 *(179.38)*	11571 *(51.47)*	7.80 *(12.55)*	2601	3.01	11th (2Hi Int) Gear			183 *(83.6)*	60 *(15.6)*	82 *(27.8)*	28.840 *(97.388)*
237.14 *(176.84)*	10098 *(44.92)*	8.81 *(14.17)*	2601	2.60	12th (2Hi Hi) Gear			183 *(83.9)*	60 *(15.6)*	83 *(28.3)*	28.840 *(97.388)*

Department of Agricultural Engineering

Dates of Test: April 19—May 9, 1980

Manufacturer: MASSEY FERGUSON, INC., 1901 Bell Ave., Des Moines, Iowa 50315

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** ***(15°/15°)*** 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 30 **API service classification** SB/SE-CA/CD **To motor** 6.848 gal *(25.920 l)* **Drained from motor** 6.373 gal *(24.122 l)* **Transmission, hydraulic, and final drive lubricant** MF Permatran **Total time engine was operated** 46 hours.

ENGINE Make Cummins Dsl **Type** eight cylinder vee with turbocharger **Serial No.** 10889862 **Crankshaft** lengthwise **Rated rpm** 2600 **Bore and stroke** 5.5" × 4.75" *(139.7 mm × 120.7 mm)* **Compression ratio** 15.5 to 1 **Displacement** 903 cu in *(14800 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge and one bypass cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** vertical **Cooling medium temperature control** two thermostats.

CHASSIS: Type four wheel drive with duals **Serial No.** 9D 002148 **Tread width** rear 70" *(1778 mm)* to 130.5" *(3314 mm)* front 70" *(1778 mm)* to 130.5" *(3314 mm)* **Wheel base** 137" *(3480 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 84.5" *(2146 mm)* Vertical distance above roadway 49.1" *(1247 mm)* Horizontal distance from center of rear wheel tread 0.3" *(7 mm)* to the right **Hydraulic control system** direct engine drive **Transmission** Selective gear fixed ratio with partial (3) range operator controlled powershift **Advertised speeds mph** ***(km/h)*** first 2.4 *(3.8)* second 2.9 *(4.6)* third 3.2 *(5.1)* fourth 3.2 *(5.2)* fifth 3.8 *(6.1)* sixth 4.3 *(6.9)* seventh 4.8 *(7.8)* eighth 5.8 *(9.3)* ninth 6.4 *(10.3)* tenth 6.5 *(10.5)* eleventh 7.7 *(12.4)* twelfth 8.7 *(14.0)* thirteenth 10.7 *(17.2)* fourteenth 12.8 *(20.6)* fifteenth 14.2 *(22.9)* sixteenth 14.4 *(23.2)* seventeenth 17.0 *(27.4)* eighteenth 19.2 *(30.9)* reverse 3.2 *(5.2)*, 3.9 *(6.3)*, 4.3 *(7.0)*, 4.4 *(7.1)*, 5.2 *(8.3)*, 5.8 *(9.4)* **Clutch** multiple wet disc operated by foot pedal **Brakes** caliper disc hydraulically operated by foot pedal or mechanically by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 246" *(6.25 m)* left 246" *(6.25 m)* **Turning space diameter** (on concrete surface without brake) right 516" *(13.10 m)* left 516" *(13.10 m)* **Power take-off** 1000 rpm at 2348 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

LUGGING ABILITY IN 8th (2Lo Int) GEAR

Crankshaft Speed rpm	2600	2351	2080	1818	1561	1304
Pull—lbs *(kN)*	15733 *(69.99)*	16908 *(75.21)*	18168 *(80.81)*	19475 *(86.63)*	18951 *(84.30)*	18337 *(81.57)*
Increase in Pull %	0	7	15	24	20	17
Power—Hp *(kW)*	242.21 *(180.61)*	234.32 *(174.73)*	221.59 *(165.24)*	206.56 *(154.03)*	172.75 *(128.82)*	139.93 *(104.35)*
Speed—Mph *(km/h)*	5.77 *(9.29)*	5.20 *(8.36)*	4.57 *(7.36)*	3.98 *(6.40)*	3.42 *(5.50)*	2.86 *(4.61)*
Slip %	4.44	4.91	5.53	5.99	5.84	5.68

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	81.5
75% of Pull at Maximum Power—Ten Hours	83.0
50% of Pull at Maximum Power—Two Hours	83.5
50% of Pull at Reduced Engine Speed—Two Hours	80.5
Bystander in 15th (3Hi Lo) gear	91.5

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Four 23.1-34; 8; inner 16 *(110)* outer 12 *(85)*	Four 23.1-34; 8; inner 16 *(110)* outer 12 *(85)*
Ballast	—Liquid (each inner)	680 lb *(308 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Four 23.1-34; 8; inner 16 *(110)* outer 12 *(85)*	Four 23.1-34; 8; inner 16 *(110)* outer 12 *(85)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	None	None
Height of drawbar		21.5 in *(545 mm)*	21.5 in *(545 mm)*
Static Weight with Operator	—Rear	13600 lb *(6169 kg)*	12240 lb *(5552 kg)*
	Front	18850 lb *(8550 kg)*	18850 lb *(8550 kg)*
	Total	32450 lb *(14719 kg)*	31090 lb *(14102 kg)*

REMARKS: All test results were d
from observed data obtained in accor
SAE and ASAE test code or official Ne
procedure. Temperature at injection
140°F *(59.8°C)*. Eleven gears were chos
15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that th
and correct report of official Tractor T

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, C
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test

Massey Ferguson 4880 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

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Test 1344.

Chairman

Engineers

ALLIS CHALMERS 7010 POWER DIRECTOR DIESEL
20 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—1021 rpm)									
	106.53	2300	6.989	0.465	15.24	191	58	75	28.893
	(79.44)		*(26.456)*	*(0.282)*	*(3.003)*	*(88.1)*	*(14.3)*	*(23.9)*	*(97.568)*
Standard Power Take-Off Speed (1000 rpm)—One Hour									
	107.52	2253	6.944	0.456	15.48	193	58	75	28.890
	(80.18)		*(26.287)*	*(0.277)*	*(3.050)*	*(89.2)*	*(14.4)*	*(23.9)*	*(97.557)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	96.41	2452	6.831	0.500	14.11	189	58	75	......
	(71.89)		*(25.858)*	*(0.304)*	*(2.780)*	*(87.2)*	*(14.4)*	*(23.9)*	......
	0.00	2572	2.566	.....	.....	178	58	74	......
	(0.00)		*(9.713)*	.....	.....	*(81.4)*	*(14.4)*	*(23.6)*	......
	49.38	2511	4.647	0.665	10.62	186	58	74	......
	(36.82)		*(17.592)*	*(0.404)*	*(2.093)*	*(85.8)*	*(14.4)*	*(23.6)*	......
	107.21	2300	7.001	0.461	15.31	194	59	76	......
	(79.94)		*(26.501)*	*(0.281)*	*(3.017)*	*(89.7)*	*(15.0)*	*(24.4)*	......
	24.99	2542	3.602	1.018	6.94	180	59	75	......
	(18.63)		*(13.636)*	*(0.619)*	*(1.366)*	*(82.2)*	*(15.0)*	*(23.9)*	......
	73.04	2477	5.692	0.550	12.83	190	60	76	......
	(54.46)		*(21.548)*	*(0.335)*	*(2.528)*	*(87.8)*	*(15.3)*	*(24.2)*	......
Av	**58.50**	**2476**	**5.057**	**0.610**	**11.57**	**186**	**59**	**75**	**28.890**
Av	***(43.63)***		***(19.141)***	***(0.371)***	***(2.279)***	***(85.7)***	***(14.8)***	***(23.9)***	***(97.557)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 11th (5SL) Gear											
87.83	5448	6.05	2302	7.60	6.974	0.561	12.59	187	43	56	29.020
(65.49)	*(24.23)*	*(9.73)*			*(26.399)*	*(0.341)*	*(2.481)*	*(85.8)*	*(6.1)*	*(13.3)*	*(97.996)*
75% of Pull at Maximum Power—Ten Hours 11th (5SL) Gear											
75.38	4254	6.64	2468	5.38	6.563	0.615	11.48	186	47	60	28.746
(56.21)	*(18.92)*	*(10.69)*			*(24.845)*	*(0.374)*	*(2.262)*	*(85.4)*	*(8.1)*	*(15.7)*	*(97.071)*
50% of Pull at Maximum Power—Two Hours 11th (5SL) Gear											
51.72	2834	6.84	2500	3.81	5.346	0.730	9.68	183	46	61	28.975
(38.57)	*(12.61)*	*(11.02)*			*(20.235)*	*(0.444)*	*(1.906)*	*(83.9)*	*(7.5)*	*(16.1)*	*(97.844)*
50% of Pull at Reduced Engine Speed—Two Hour: 14th (2FH) Gear											
52.10	2857	6.84	1882	3.81	4.372	0.593	11.92	184	59	68	28.325
(38.85)	*(12.71)*	*(11.00)*			*(16.550)*	*(0.360)*	*(2.347)*	*(84.4)*	*(15.0)*	*(19.7)*	*(95.649)*
MAXIMUM POWER IN SELECTED GEARS											
79.19	9426	3.15	2427	14.95	4th (1 FL) Gear			184	55	62	28.320
(59.05)	*(41.93)*	*(5.07)*						*(84.4)*	*(12.8)*	*(16.7)*	*(95.632)*
78.33	8852	3.32	2301	14.95	5th (2 SH) Gear			187	62	73	28.340
(58.41)	*(39.37)*	*(5.34)*						*(86.1)*	*(16.7)*	*(22.8)*	*(95.700)*
84.30	8281	3.82	2301	12.10	6th (1 FH) Gear			188	56	63	28.320
(62.86)	*(36.83)*	*(6.14)*						*(86.7)*	*(13.3)*	*(17.2)*	*(95.632)*
85.08	8382	3.81	2301	12.29	7th (3 SL) Gear			188	56	63	28.320
(63.45)	*(37.29)*	*(6.13)*						*(86.7)*	*(13.3)*	*(17.2)*	*(95.632)*
88.14	7703	4.29	2302	11.52	8th (4 SL) Gear			186	39	50	29.050
(65.72)	*(34.26)*	*(6.91)*						*(85.6)*	*(3.9)*	*(10.0)*	*(98.097)*
87.75	6789	4.85	2298	9.54	9th (3 SH) Gear			185	38	48	29.060
(65.44)	*(30.20)*	*(7.80)*						*(85.0)*	*(3.3)*	*(8.9)*	*(98.131)*
89.11	6080	5.50	2300	8.30	10th (4 SH) Gear			186	38	48	29.060
(66.45)	*(27.05)*	*(8.84)*						*(85.3)*	*(3.3)*	*(8.9)*	*(98.131)*
91.44	5671	6.05	2300	7.53	11th (5 SL) Gear			186	36	45	29.060
(68.19)	*(25.23)*	*(9.73)*						*(85.6)*	*(2.2)*	*(7.2)*	*(98.131)*
90.53	5193	6.54	2301	7.03	12th (2 FL) Gear			186	39	50	29.050
(67.51)	*(23.10)*	*(10.52)*						*(85.6)*	*(3.9)*	*(10.0)*	*(98.097)*
86.87	4270	7.63	2302	5.80	13th (5 SH) Gear			187	40	51	29.050
(64.78)	*(19.00)*	*(12.28)*						*(86.1)*	*(4.4)*	*(10.6)*	*(98.097)*
90.42	4128	8.21	2300	5.43	14th (2 FH) Gear			186	40	51	29.050

Department of Agricultural Engineering

Dates of Test: May 1—13, 1980

Manufacturer: ALLIS CHALMERS CORPORATION, P.O. Box 512, Milwaukee, Wisconsin 53201

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 30 **API service classification** SE-CD **To motor** 3.279 gal *(12.411 l)* **Drained from motor** 2.900 gal *(10.977 l)* **Transmission and final drive lubricant** A.C. Power fluid 821 **Total time engine was operated** 41.0 hours.

ENGINE Make Allis Chalmers Dsl **Type** six cylinder vertical with turbocharger **Serial No.** 4907684 **Crankshaft** lengthwise **Rated rpm** 2300 **Bore and stroke** 3.875" × 4.25" *(98.4 mm × 107.9 mm)* **Compression ratio** 16.25 to 1 **Displacement** 301 cu in *(4932 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with centrifugal precleaner **Oil filter** two full flow elements **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** one paper cartridge **Muffler** vertical **Cooling medium temperature control** two thermostats

CHASSIS: Type standard **Serial No.** 7010 1649 **Tread width** rear 64" *(1626 mm)* to 97" *(2464 mm)* front 60" *(1524 mm)* to 91" *(2311 mm)* **Wheel base** 106" *(2692 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 30.8" *(782 mm)* Vertical distance above roadway 38.7" *(983 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** Selective gear fixed ratio with partial (2) range operator controlled power shift **Advertised speeds mph** ***(km/h)*** first 1.6 *(2.6)* second 2.0 *(3.2)* third 3.3 *(5.3)* fourth 3.7 *(6.0)* fifth 4.1 *(6.6)* sixth 4.5 *(7.2)* seventh 4.5 *(7.2)* eighth 5.1 *(8.2)* ninth 5.6 *(9.0)* tenth 6.2 *(10.0)* eleventh 6.8 *(11.0)* twelfth 7.3 *(11.7)* thirteenth 8.4 *(13.5)* fourteenth 9.1 *(14.6)* fifteenth 10.1 *(16.3)* sixteenth 11.3 *(18.3)* seventeenth 12.5 *(20.1)* eighteenth 13.9 *(22.4)* nineteenth 15.2 *(24.5)* twentieth 18.8 *(30.3)* reverse 3.1 *(5.0)*, 3.8 *(6.1)*, 6.8 *(11.0)*, 8.4 *(13.5)* **Clutch** multiple wet disc hydraulically operated by foot pedal **Brakes** multiple wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 149" *(3.79 m)* left 148" *(3.75 m)* (on concrete surface without brake) right 168" *(4.26 m)* left 167" *(4.25 m)* **Turning space diameter** (on concrete surface with brake applied) right 310" *(7.87 m)* left 306" *(7.77 m)* (on concrete surface without brake) right 346" *(8.80 m)* left 346" *(8.78 m)* **Power take-off** 1000 rpm at 2253 engine rpm and 540 rpm at 2230 engine rpm.

LUGGING ABILITY IN 11th (5 SL) GEAR

Crankshaft Speed rpm	2300	2072	1841	1613	1382	1155
Pull—lbs	5671	6337	6622	7096	7155	6206
(kN)	*(25.23)*	*(28.19)*	*(29.46)*	*(31.56)*	*(31.83)*	*(27.61)*
Increase in Pull %	0	12	17	25	26	9
Power—Hp	91.44	91.04	84.02	78.19	67.47	49.78
(kW)	*(68.19)*	*(67.89)*	*(62.65)*	*(58.30)*	*(50.31)*	*(37.12)*
Speed—Mph	6.05	5.39	4.76	4.13	3.54	3.01
(km/h)	*(9.73)*	*(8.67)*	*(7.66)*	*(6.65)*	*(5.69)*	*(4.84)*
Slip %	7.53	8.58	9.13	9.94	10.07	8.44

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	77.5
75% of Pull at Maximum Power—Ten Hours	77.5
50% of Pull at Maximum Power—Two Hours	76.5
50% of Pull at Reduced Engine Speed—Two Hours	75.0
Bystander in 20th (5 FH) gear	87.5

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 18.4-38; 8; 18 *(125)*	Two 18.4-38; 8; 18 *(125)*
Ballast	—Liquid (each)	658 lb *(298 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 10.00-16; 6; 32 *(220)*	Two 10.00-16; 6; 32 *(220)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	108 lb *(49 kg)*	None
Height of Drawbar		20.0 in *(510 mm)*	20.0 in *(510 mm)*
Static Weight with Operator	—Rear	9300 lb *(4218 kg)*	7985 lb *(3622 kg)*
	—Front	3490 lb *(1583 kg)*	3275 lb *(1486 kg)*
	—Total	12790 lb *(5801 kg)*	11260 lb *(5108 kg)*

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 142°F *(61.1°C)*. Eleven gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1345.**

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

Allis Chalmers 7010 Power Director Dsl

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1346
ALLIS CHALMERS 7010 POWER SHIFT DIESEL
12 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Temperature °F *(°C)* Air wet bulb	Temperature °F *(°C)* Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—1021 rpm)									
	106.72	2300	7.018	0.464	15.21	191	56	75	28.880
	(79.58)		*(26.565)*	*(0.282)*	*(2.996)*	*(88.3)*	*(13.3)*	*(23.8)*	*(97.523)*
Standard Power Take-Off Speed (1000 rpm)—One Hour									
	106.33	2253	6.889	0.458	15.43	192	56	75	28.880
	(79.29)		*(26.078)*	*(0.278)*	*(3.040)*	*(88.7)*	*(13.3)*	*(24.0)*	*(97.523)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	97.02	2462	6.822	0.497	14.22	188	56	75	......
	(72.35)		*(25.826)*	*(0.302)*	*(2.802)*	*(86.7)*	*(13.6)*	*(23.9)*	......
	0.00	2556	2.506	.....	.....	176	56	75	......
	(0.00)		*(9.488)*	.....	.....	*(80.0)*	*(13.3)*	*(23.9)*	......
	49.53	2506	4.575	0.652	10.83	186	56	76	......
	(36.94)		*(17.319)*	*(0.397)*	*(2.133)*	*(85.3)*	*(13.1)*	*(24.2)*	......
	108.91	2300	7.048	0.457	15.45	192	55	75	......
	(81.21)		*(26.678)*	*(0.278)*	*(3.044)*	*(88.9)*	*(12.8)*	*(23.9)*	......
	24.91	2533	3.543	1.004	7.03	178	54	75	......
	(18.58)		*(13.411)*	*(0.611)*	*(1.385)*	*(81.1)*	*(12.5)*	*(23.9)*	......
	73.43	2482	5.633	0.542	13.04	189	55	76	......
	(54.76)		*(21.323)*	*(0.330)*	*(2.568)*	*(87.2)*	*(12.8)*	*(24.4)*	......
Av	**58.97**	**2473**	**5.021**	**0.601**	**11.74**	**185**	**55**	**75**	**28.865**
Av	***(43.97)***		***(19.007)***	***(0.366)***	***(2.313)***	***(84.9)***	***(13.0)***	***(24.0)***	***(97.473)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 7th (2 F) Gear											
89.10	5480	6.10	2300	6.93	7.169	0.568	12.43	187	48	58	28.610
(66.44)	*(24.38)*	*(9.81)*			*(27.136)*	*(0.346)*	*(2.448)*	*(86.1)*	*(8.6)*	*(14.2)*	*(96.612)*
75% of Pull at Maximum Power—Ten Hours 7th (2 F) Gear											
75.43	4217	6.71	2476	4.83	6.645	0.622	11.35	185	49	59	28.905
(56.25)	*(18.76)*	*(10.80)*			*(25.153)*	*(0.378)*	*(2.236)*	*(84.9)*	*(9.2)*	*(14.9)*	*(97.608)*
50% of Pull at Maximum Power—Two Hours 7th (2 F) Gear											
52.08	2836	6.89	2501	3.37	5.434	0.737	9.58	183	51	61	28.550
(38.83)	*(12.61)*	*(11.08)*			*(20.570)*	*(0.448)*	*(1.888)*	*(83.9)*	*(10.3)*	*(15.8)*	*(96.409)*
50% of Pull at Reduced Engine Speed—Two Hours 9th (3 F) Gear											
51.64	2809	6.89	1815	3.25	4.301	0.588	12.01	181	54	64	28.540
(38.51)	*(12.49)*	*(11.09)*			*(16.282)*	*(0.358)*	*(2.365)*	*(82.8)*	*(11.9)*	*(17.8)*	*(96.375)*
MAXIMUM POWER IN SELECTED GEARS											
76.99	9516	3.03	2452	14.91		3rd (3 S) Gear		182	45	51	28.950
(57.41)	*(42.33)*	*(4.88)*						*(83.3)*	*(7.2)*	*(10.6)*	*(97.760)*
85.83	8884	3.62	2300	14.12		4th (4 S) Gear		187	46	55	28.660
(64.01)	*(39.52)*	*(5.83)*						*(85.8)*	*(7.8)*	*(12.8)*	*(96.781)*
91.08	8060	4.24	2300	10.80		5th (1 F) Gear		188	46	55	28.670
(67.91)	*(35.85)*	*(6.82)*						*(86.4)*	*(7.8)*	*(12.8)*	*(96.814)*
84.61	6622	4.79	2300	8.21		6th (5 S) Gear		187	45	54	28.680
(63.09)	*(29.46)*	*(7.71)*						*(86.1)*	*(7.2)*	*(12.2)*	*(96.848)*
91.61	5623	6.11	2300	6.78		7th (2 F) Gear		187	45	53	28.680
(68.32)	*(25.01)*	*(9.83)*						*(86.1)*	*(7.2)*	*(11.7)*	*(96.848)*
86.35	5239	6.18	2301	6.42		8th (6 S) Gear		187	45	54	28.680
(64.39)	*(23.30)*	*(9.95)*						*(86.1)*	*(7.2)*	*(12.2)*	*(96.848)*
91.45	3989	8.60	2300	4.71		9th (3 F) Gear		187	46	56	28.650
(68.20)	*(17.74)*	*(13.84)*						*(86.1)*	*(7.8)*	*(13.3)*	*(96.747)*

Department of Agricultural Engineering

Dates of Test: May 2—14, 1980

Manufacturer: ALLIS CHALMERS CORPORATION, P.O. Box 512, Milwaukee, Wisconsin 53201

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 30 **API service classification** SE-CD **To motor** 3.285 gal *(12.434 l)* **Drained from motor** 3.060 gal *(11.582 l)* **Transmission and final drive lubricant** A.C. Power fluid 821 **Total time engine was operated** 33.0 hours.

ENGINE Make Allis Chalmers Dsl **Type** six cylinder vertical with turbocharger **Serial No.** 4907332 **Crankshaft** lengthwise **Rated rpm** 2300 **Bore and stroke** 3.875" × 4.25" *(98.4 mm × 107.9 mm)* **Compression ratio** 16.25 to 1 **Displacement** 301 cu in *(4932 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with centrifugal precleaner **Oil filter** two full flow cartridges **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** one paper cartridge **Muffler** vertical **Cooling medium temperature control** two thermostats

CHASSIS: Type standard **Serial No.** 7010 S 1636 **Tread width** rear 64" *(1626 mm)* to 97" *(2464 mm)* front 60" *(1524 mm)* to 91" *(2311 mm)* **Wheel base** 106" *(2692 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 30.3" *(770 mm)* Vertical distance above roadway 38.1" *(968 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** Selective gear fixed ratio with partial (6) range operator controlled power shift **Advertised speeds mph *(km/h)*** first 1.8 *(2.9)* second 2.5 *(4.0)* third 3.5 *(5.6)* fourth 4.4 *(7.1)* fifth 4.9 *(7.9)* sixth 5.4 *(8.7)* seventh 6.8 *(11.0)* eighth 6.8 *(11.0)* ninth 9.3 *(15.0)* tenth 11.8 *(19.0)* eleventh 14.6 *(23.5)* twelfth 18.4 *(30.0)* reverse 2.9 *(4.7)*, 7.9 *(12.7)* **Clutch** multiple wet disc hydraulically operated by foot pedal **Brakes** multiple wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 148" *(3.77 m)* left 148" *(3.76 m)* (on concrete surface without brake) right 168" *(4.26 m)* left 168" *(4.26 m)* **Turning space diameter** (on concrete surface with brake applied) right 308" *(7.82 m)* left 307" *(7.80 m)* (on concrete surface without brake) right 346" *(8.79 m)* left 346" *(8.79 m)* **Power take-off** 1000 rpm at 2253 engine rpm and 540 rpm at 2230 engine rpm.

LUGGING ABILITY IN 7th (2 F) GEAR

Crankshaft Speed rpm	2300	2071	1840	1609	1376	1148
Pull—lbs *(kN)*	5623 *(25.01)*	6256 *(27.83)*	6683 *(29.73)*	7011 *(31.19)*	6808 *(30.29)*	5836 *(25.96)*
Increase in Pull %	0	11	19	25	21	4
Power—Hp *(kW)*	91.61 *(68.32)*	90.93 *(67.80)*	85.68 *(63.89)*	78.21 *(58.32)*	65.12 *(48.56)*	47.21 *(35.20)*
Speed—Mph *(km/h)*	6.11 *(9.83)*	5.45 *(8.77)*	4.81 *(7.74)*	4.18 *(6.73)*	3.59 *(5.77)*	3.03 *(4.88)*
Slip %	6.78	7.64	8.35	8.77	8.49	7.22

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	78.0
75% of Pull at Maximum Power—Ten Hours	77.5
50% of Pull at Maximum Power—Two Hours	77.0
50% of Pull at Reduced Engine Speed—Two Hours	75.0
Bystander in 11th (5 F) gear	88.0

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 18.4-38; 8; 18 *(125)*	Two 18.4-38; 8; 18 *(125)*
Ballast	—Liquid (each)	575 lb *(261 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 10.00-16; 6; 32 *(220)*	Two 10.00-16; 6; 32 *(220)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	108 lb *(49 kg)*	None
Height of Drawbar		20.5 in *(520 mm)*	20.5 in *(520 mm)*
Static Weight with Operator—Rear		9270 lb *(4205 kg)*	8120 lb *(3683 kg)*
—Front		3470 lb *(1574 kg)*	3255 lb *(1476 kg)*
—Total		12740 lb *(5779 kg)*	11375 lb *(5159 kg)*

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 140°F *(60.0°C)*. Seven gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1346.**

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

7010
ALLIS-CHALMERS

Allis Chalmers 7010 Power Shift Dsl

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1347 — SATOH MITSUBISHI STALLION S750 DD ALSO S750 D 9 SPEED

POWER TAKE-OFF PERFORMANCE

Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—652 rpm)								
33.45 *(24.95)*	2500	2.851 *(10.793)*	0.602 *(0.366)*	11.73 *(2.311)*	216 *(102.5)*	56 *(13.6)*	75 *(23.8)*	28.913 *(97.636)*
Standard Power Take-Off Speed (540 rpm)—One Hour								
28.11 *(20.96)*	2070	2.358 *(8.925)*	0.592 *(0.360)*	11.92 *(2.349)*	218 *(103.4)*	56 *(13.5)*	75 *(23.9)*	28.930 *(97.692)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
29.39 *(21.91)*	2584	2.116 *(8.008)*	0.508 *(0.309)*	13.89 *(2.736)*	204 *(95.3)*	56 *(13.6)*	75 *(23.9)*	....
0.00 *(0.00)*	2686	0.828 *(3.136)*	....	....	174 *(79.2)*	56 *(13.3)*	75 *(23.9)*	....
15.00 *(11.18)*	2638	1.342 *(5.082)*	0.632 *(0.384)*	11.17 *(2.201)*	182 *(83.1)*	56 *(13.3)*	76 *(24.4)*	....
33.20 *(24.76)*	2501	2.897 *(10.967)*	0.616 *(0.375)*	11.46 *(2.258)*	211 *(99.4)*	55 *(12.8)*	75 *(23.9)*	....
7.57 *(5.64)*	2662	0.998 *(3.779)*	0.931 *(0.566)*	7.58 *(1.494)*	179 *(81.7)*	55 *(12.8)*	74 *(23.6)*	....
22.27 *(16.61)*	2611	1.682 *(6.368)*	0.533 *(0.325)*	13.24 *(2.608)*	188 *(86.4)*	55 *(12.8)*	76 *(24.2)*	....
Av 17.90 ***Av (13.35)***	**2614**	**1.644** ***(6.223)***	**0.648** ***(0.394)***	**10.89** ***(2.145)***	**190** ***(87.5)***	**56** ***(13.1)***	**75** ***(24.0)***	**28.923** ***(97.670)***

DRAWBAR PERFORMANCE (Front Wheel Drive Disengaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 6th (M-3) Gear											
26.71 *(19.92)*	2029 *(9.03)*	4.94 *(7.94)*	2500	6.00	2.708 *(10.251)*	0.716 *(0.436)*	9.86 *(1.943)*	210 *(98.9)*	56 *(13.3)*	73 *(22.8)*	28.950 *(97.760)*
75% of Pull at Maximum Power—Ten Hours 6th (M-3) Gear											
22.48 *(16.77)*	1626 *(7.23)*	5.18 *(8.34)*	2608	5.30	2.011 *(7.612)*	0.632 *(0.384)*	11.18 *(2.203)*	180 *(82.2)*	51 *(10.6)*	52 *(11.2)*	28.841 *(97.392)*
50% of Pull at Maximum Power—Two Hours 6th (M-3) Gear											
15.43 *(11.51)*	1087 *(4.83)*	5.33 *(8.57)*	2638	3.88	1.611 *(6.097)*	0.737 *(0.448)*	9.58 *(1.888)*	178 *(80.8)*	52 *(11.1)*	53 *(11.7)*	28.760 *(97.118)*
50% of Pull at Reduced Engine Speed—Two Hours 8th (H-2) Gear											
15.51 *(11.57)*	1089 *(4.84)*	5.34 *(8.60)*	1700	3.71	1.310 *(4.958)*	0.596 *(0.363)*	11.84 *(2.333)*	176 *(80.0)*	54 *(11.9)*	54 *(12.2)*	28.770 *(97.132)*
MAXIMUM POWER IN SELECTED GEARS											
24.82 *(18.51)*	4295 *(19.11)*	2.17 *(3.49)*	2577	14.89		4th (M-1) Gear		182 *(83.3)*	54 *(12.2)*	57 *(13.9)*	28.790 *(97.220)*
27.23 *(20.30)*	3600 *(16.02)*	2.84 *(4.56)*	2502	12.03		5th (M-2) Gear		204 *(95.6)*	56 *(13.3)*	70 *(21.1)*	28.940 *(97.726)*
28.57 *(21.30)*	2168 *(9.65)*	4.94 *(7.95)*	2502	5.86		6th (M-3) Gear		196 *(91.1)*	54 *(12.2)*	64 *(17.8)*	28.950 *(97.760)*
28.99 *(21.61)*	1832 *(8.15)*	5.93 *(9.55)*	2500	5.20		7th (H-1) Gear		203 *(95.0)*	55 *(12.8)*	70 *(21.1)*	28.930 *(97.692)*
28.36 *(21.15)*	1355 *(6.03)*	7.85 *(12.63)*	2500	3.85		8th (H-2) Gear		204 *(95.3)*	57 *(13.9)*	72 *(22.2)*	28.930 *(97.692)*

Department of Agricultural Engineering

Dates of Test: May 10—19, 1980

Manufacturer: MITSUBISHI AGRICULTURAL MACHINERY CO., LTD, Higashi Izumo-cho Yatsuka-gun Shimane Pref. Japan

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 30 **API service classification** SB/SE-CA/CD **To motor** 1.474 gal *(5.579 l)* **Drained from motor** 1.332 gal *(5.042 l)* **Transmission and final drive lubricant** SAE 80 **Total time engine was operated** 48.0 hours.

ENGINE Make ISUZU Dsl **Type** three cylinder vertical **Serial No.** 530033 **Crankshaft** lengthwise **Rated rpm** 2500 **Bore and stroke** 3.386" × 4.016" *(86 mm × 102 mm)* **Compression ratio** 20.0 to 1 **Displacement** 108.4 cu in *(1777 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element **Oil filter** one full flow paper cartridge **Fuel filter** one paper cartridge and one mesh screen **Muffler** vertical **Cooling medium temperature control** one thermostat

CHASSIS: Type front wheel assist **Serial No.** S-750DD-00042 **Tread width** rear 52" *(1320 mm)* to 71.7" *(1820 mm)* front 50.2" *(1275 mm)* **Wheel base** 73.6" *(1870 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 28.1" *(714 mm)* Vertical distance above roadway 33.1" *(841 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** Selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 0.9 *(1.5)* second 1.2 *(1.9)* third 1.9 *(3.1)* fourth 2.5 *(4.0)* fifth 3.2 *(5.2)* sixth 5.2 *(8.4)* seventh 6.2 *(10.0)* eighth 8.1 *(13.1)* ninth 15.9 *(25.6)* reverse 1.5 *(2.4)*, 4.0 *(6.4)* 10.1 *(16.2)* **Clutch** dual dry disc operated by foot pedal **Brakes** expanding shoe operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 110.2" *(2.80 m)* left 110.2" *(2.80 m)* (on concrete surface without brake) right 121.2" *(3.08 m)* left 121.2" *(3.08 m)* **Turning space diameter** (on concrete surface with brake applied) right 228.2" *(5.80 m)* left 228.2" *(5.80 m)* (on concrete surface without brake) right 250" *(6.35 m)* left 250" *(6.35 m)* **Power take-off** 540 rpm at 2070 engine rpm.

LUGGING ABILITY IN 6th (M-3) GEAR

Crankshaft Speed rpm	2502	2252	1994	1754	1485	1240
Pull—lbs *(kN)*	2168 *(9.65)*	2237 *(9.95)*	2251 *(10.01)*	2271 *(10.10)*	2178 *(9.69)*	2067 *(9.19)*
Increase in Pull %	0	3	4	5	0	−5
Power—Hp *(kW)*	28.57 *(21.30)*	26.48 *(19.74)*	23.56 *(17.57)*	20.89 *(15.57)*	17.01 *(12.69)*	13.52 *(10.08)*
Speed—Mph *(km/h)*	4.94 *(7.95)*	4.44 *(7.14)*	3.93 *(6.32)*	3.45 *(5.55)*	2.93 *(4.72)*	2.45 *(3.95)*
Slip %	5.86	6.13	6.24	6.35	6.02	5.59

TRACTOR SOUND LEVEL WITHOUT CAB	dB(A)	Front Wheel Drive Disengaged dB(A)
Maximum Available Power—Two Hours	99.5	99.0
75% of Pull at Maximum Power—Ten Hours	–	97.0
50% of Pull at Maximum Power—Two Hours	–	98.5
50% of Pull at Reduced Engine Speed—Two Hours	–	92.5
Bystander in 9th (H-3) gear	–	84.5

DRAWBAR PERFORMANCE
(Front Wheel Drive Engaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 6th (M-3) Gear											
26.14 *(19.49)*	1944 *(8.65)*	5.04 *(8.11)*	2500	4.74	2.726 *(10.318)*	0.737 *(0.448)*	9.59 *(1.889)*	213 *(100.3)*	57 *(13.6)*	75 *(23.6)*	28.885 *(97.541)*
MAXIMUM POWER IN SELECTED GEARS											
26.77 *(19.97)*	4655 *(20.71)*	2.16 *(3.47)*	2543	14.94	4th (M-1) Gear			183 *(83.9)*	54 *(12.2)*	57 *(13.9)*	28.790 *(97.220)*
28.27 *(21.08)*	2107 *(9.37)*	5.03 *(8.10)*	2499	5.05	6th (M-3) Gear			199 *(92.8)*	55 *(12.8)*	68 *(20.0)*	28.950 *(97.760)*

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 13.6-28; 4; 14 *(95)*	Two 13.6-28; 4; 14 *(95)*
Ballast	—Liquid (each)	425 lb *(193 kg)*	None
	—Cast Iron (each)	385 lb *(174 kg)*	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 7-16; 4; 26 *(180)*	Two 7-16; 4; 26 *(180)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	None	None
Height of Drawbar		17.5 in *(445 mm)*	17.5 in *(445 mm)*
Static Weight with Operator	—Rear	4050 lb *(1837 kg)*	2430 lb *(1103 kg)*
	—Front	1500 lb *(680 kg)*	1500 lb *(680 kg)*
	—Total	5550 lb *(2517 kg)*	3930 lb *(1783 kg)*

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 168°F *(75.6°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The front wheel final drives leaked oil slightly during the tests.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1347**.

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

Satoh Mitsubishi Stallion

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1348 — KUBOTA M4500DT DIESEL
ALSO KUBOTA M4500 DIESEL
16 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp (kW)	Crank shaft speed rpm	Fuel Consumption gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Temperature °F (°C) Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg (kPa)
	MAXIMUM POWER AND FUEL CONSUMPTION								
	Rated Engine Speed—Two Hours (PTO Speed—640 rpm)								
	49.72 *(37.07)*	2600	3.460 *(13.098)*	0.491 *(0.299)*	14.37 *(2.831)*	222 *(105.8)*	55 *(12.9)*	75 *(23.8)*	28.943 *(97.737)*
	Standard Power Take-Off Speed (540 rpm)—One Hour								
	44.49 *(33.17)*	2192	2.928 *(11.085)*	0.465 *(0.283)*	15.19 *(2.993)*	223 *(106.3)*	54 *(12.2)*	75 *(23.9)*	28.930 *(97.692)*
	VARYING POWER AND FUEL CONSUMPTION—Two Hours								
	42.87 *(31.97)*	2638	2.935 *(11.112)*	0.484 *(0.294)*	14.60 *(2.877)*	206 *(96.7)*	54 *(12.2)*	75 *(23.9)*	....
	0.00 *(0.00)*	2787	0.981 *(3.715)*	....	....	184 *(84.4)*	54 *(12.2)*	75 *(23.9)*	....
	22.08 *(16.46)*	2716	1.856 *(7.027)*	0.594 *(0.361)*	11.89 *(2.343)*	188 *(86.7)*	54 *(12.2)*	75 *(23.9)*	....
	50.59 *(37.73)*	2600	3.522 *(13.331)*	0.492 *(0.299)*	14.37 *(2.830)*	217 *(102.8)*	56 *(13.1)*	75 *(23.9)*	....
	11.13 *(8.30)*	2740	1.376 *(5.210)*	0.873 *(0.531)*	8.09 *(1.593)*	184 *(84.4)*	56 *(13.6)*	75 *(23.9)*	....
	32.74 *(24.42)*	2685	2.370 *(8.973)*	0.511 *(0.311)*	13.81 *(2.721)*	192 *(88.6)*	56 *(13.6)*	75 *(23.9)*	....
Av *Av*	**26.57** ***(19.81)***	**2694**	**2.174** ***(8.228)***	**0.578** ***(0.351)***	**12.22** ***(2.408)***	**195** ***(90.6)***	**55** ***(12.8)***	**75** ***(23.9)***	**28.917** ***(97.649)***

DRAWBAR PERFORMANCE
(Front Wheel Drive Disengaged)

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Temp. °F (°C) Cooling med	Air wet bulb	Air dry bulb	Barom. inch Hg (kPa)
Maximum Available Power—Two Hours 13th (HH-1) Gear											
40.85 *(30.46)*	3102 *(13.80)*	4.94 *(7.95)*	2600	9.96	3.434 *(12.999)*	0.594 *(0.361)*	11.90 *(2.343)*	210 *(98.9)*	59 *(15.0)*	68 *(20.0)*	28.935 *(97.709)*
75% of Pull at Maximum Power—Ten Hours 13th (HH-1) Gear											
33.24 *(24.79)*	2389 *(10.63)*	5.22 *(8.40)*	2660	6.96	2.765 *(10.466)*	0.587 *(0.357)*	12.02 *(2.369)*	191 *(88.3)*	59 *(15.0)*	69 *(20.6)*	28.877 *(97.513)*
50% of Pull at Maximum Power—Two Hours 13th (HH-1) Gear											
23.06 *(17.20)*	1601 *(7.12)*	5.40 *(8.69)*	2691	4.77	2.142 *(8.107)*	0.656 *(0.399)*	10.77 *(2.121)*	187 *(85.8)*	60 *(15.3)*	66 *(18.6)*	28.990 *(97.895)*
50% of Pull at Reduced Engine Speed—Two Hours 14th (HH-2) Gear											
23.10 *(17.23)*	1599 *(7.11)*	5.42 *(8.72)*	2211	4.53	1.876 *(7.102)*	0.574 *(0.349)*	12.31 *(2.425)*	188 *(86.4)*	62 *(16.7)*	73 *(22.5)*	28.990 *(97.895)*
MAXIMUM POWER IN SELECTED GEARS											
33.75 *(25.17)*	4812 *(21.40)*	2.63 *(4.23)*	2679	14.99	11th (HL-3) Gear			186 *(85.6)*	54 *(12.2)*	56 *(13.3)*	29.010 *(97.962)*
41.17 *(30.70)*	4335 *(19.28)*	3.56 *(5.73)*	2600	13.21	12th (HL-4) Gear			194 *(90.0)*	55 *(12.8)*	57 *(13.9)*	28.990 *(97.895)*
41.96 *(31.29)*	3187 *(14.18)*	4.94 *(7.95)*	2600	9.90	13th (HH-1) Gear			199 *(92.8)*	55 *(12.8)*	58 *(14.4)*	28.940 *(97.726)*
42.50 *(31.69)*	2588 *(11.51)*	6.16 *(9.91)*	2600	7.63	14th (HH-2) Gear			204 *(95.6)*	57 *(13.9)*	65 *(18.3)*	28.940 *(97.726)*

LUGGING ABILITY IN 13th (HH-1) GEAR

Crankshaft Speed rpm	2600	2343	2080	1824	1558	1298	1027
Pull—lbs *(kN)*	3187 *(14.18)*	3319 *(14.76)*	3409 *(15.16)*	3549 *(15.79)*	3675 *(16.35)*	3795 *(16.88)*	3625 *(16.12)*
Increase in Pull %	0	4	7	11	15	19	14
Power—Hp *(kW)*	41.96 *(31.29)*	39.21 *(29.24)*	35.60 *(26.55)*	32.36 *(24.13)*	28.42 *(21.19)*	24.25 *(18.08)*	18.46 *(13.77)*
Speed—Mph *(km/h)*	4.94 *(7.95)*	4.43 *(7.13)*	3.92 *(6.30)*	3.42 *(5.50)*	2.90 *(4.67)*	2.40 *(3.86)*	1.91 *(3.07)*
Slip %	9.90	10.22	10.64	11.05	11.77	12.37	11.77

Department of Agricultural Engineering

Dates of Test: May 12—22, 1980

Manufacturer: KUBOTA LTD, 22 Funade-cho, 2-chome, Naniwa-ku, Osaka, Japan

FUEL, OIL AND TIME: **Fuel** No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60° *(15°/15°)*** 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 20-20W **API service classification** SB/SE-CA/CD **To motor** 2.682 gal *(10.151 l)* **Drained from motor** 2.586 gal *(9.788 l)* **Transmission and final drive lubricant** SAE 80 **Total time engine was operated** 38.5 hours.

ENGINE **Make** Kubota Dsl **Type** six cylinder vertical **Serial No.** S2600-A-1622 **Crankshaft** lengthwise **Rated rpm** 2600 **Bore and stroke** 3.23" × 3.23" *(82 mm × 82 mm)* **Compression ratio** 21 to 1 **Displacement** 158.5 cu in *(2598 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element **Oil filter** one full flow paper cartridge **Fuel filter** one paper cartridge **Muffler** vertical **Cooling medium temperature control** one thermostat

CHASSIS: **Type** front wheel assist **Serial No.** M4500DT-10788 **Tread width** rear 51.2" *(1300 mm)* to 74.8" *(1900 mm)* front 55.9" *(1420 mm)* **Wheel base** 79.5" *(2020 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 35.2" *(895 mm)* Vertical distance above roadway 39.3" *(999 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** Selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 0.3 *(0.4)* second 0.3 *(0.5)* third 0.5 *(0.9)* fourth 0.7 *(1.2)* fifth 1.0 *(1.6)* sixth 1.2 *(1.9)* seventh 1.5 *(2.4)* eighth 1.8 *(3.0)* ninth 2.0 *(3.2)* tenth 2.8 *(4.4)* eleventh 3.1 *(5.0)* twelfth 4.2 *(6.8)* thirteenth 5.6 *(9.1)* fourteenth 6.9 *(11.0)* fifteenth 11.6 *(18.6)* sixteenth 15.8 *(25.4)* reverse 0.3 *(0.5)*, 1.3 *(2.0)*, 2.0 *(3.2)*, 7.4 *(11.9)* **Clutch** single dry disc operated by foot pedal **Brakes** multiple wet disc operated by two foot pedals which can be locked together and hand lever **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 122" *(3.10 m)* left 122" *(3.10 m)* (on concrete surface without brake) right 153.5" *(3.90 m)* left 153.5" *(3.90 m)* **Turning space diameter** (on concrete surface with brake applied) right 252" *(6.40 m)* left 252" *(6.40 m)* (on concrete surface without brake) right 315" *(8.00 m)* left 315" *(8.00 m)* **Power take-off** 540 rpm at 2192 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 165°F *(73.8°C)*. Four gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

TRACTOR SOUND LEVEL WITHOUT CAB	dB(A)	Front Wheel Drive Disengaged dB(A)
Maximum Available Power—Two Hours	91.5	90.5
75% of Pull at Maximum Power—Ten Hours	–	90.0
50% of Pull at Maximum Power—Two Hours	–	90.0
50% of Pull at Reduced Engine Speed—Two Hours	–	88.0
Bystander in 16th (HH-4) gear	–	79.5

DRAWBAR PERFORMANCE
(Front Wheel Drive Engaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 13th (HH-1) Gear											
41.09 *(30.64)*	2966 *(13.19)*	5.20 *(8.36)*	2601	6.93	3.345 *(12.664)*	0.575 *(0.350)*	12.28 *(2.419)*	213 *(100.3)*	60 *(15.6)*	71 *(21.4)*	28.915 *(97.642)*
MAXIMUM POWER IN SELECTED GEARS											
36.68 *(27.35)*	5932 *(26.39)*	2.32 *(3.73)*	2638	14.96	10th (LH-4) Gear			191 *(88.1)*	54 *(12.2)*	56 *(13.3)*	29.010 *(97.962)*
42.53 *(31.71)*	3077 *(13.69)*	5.18 *(8.34)*	2598	7.05	13th (HH-1) Gear			203 *(94.7)*	56 *(13.3)*	61 *(16.1)*	28.940 *(97.726)*
42.00 *(31.32)*	2452 *(10.91)*	6.42 *(10.34)*	2601	5.59	14th (HH-2) Gear			204 *(95.3)*	56 *(13.3)*	63 *(17.2)*	28.940 *(97.726)*

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 14.9-28; 6; 16 *(110)*	Two 14.9-28; 6; 16 *(110)*
Ballast	—Liquid (each)	520 lb *(236 kg)*	None
	—Cast Iron (each)	475 lb *(215 kg)*	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 9.5-24; 6; 18 *(125)*	Two 9.5-24; 6; 18 *(125)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	323 lb *(146 kg)*	None
Height of Drawbar		18 in *(455 mm)*	18 in *(455 mm)*
Static Weight with Operator	—Rear	5020 lb *(2277 kg)*	3030 lb *(1375 kg)*
	—Front	2780 lb *(1261 kg)*	2135 lb *(968 kg)*
	—Total	7800 lb *(3538 kg)*	5165 lb *(2343 kg)*

KUBOTA M45DT

Kubota M4500DT Diesel

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1348.

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1349 — KUBOTA M7500DT DIESEL
ALSO KUBOTA M7500 DIESEL
16 SPEED

POWER TAKE-OFF PERFORMANCE

Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption			Temperature °F *(°C)*			
		gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—643 rpm)								
72.34 *(53.95)*	2400	4.342 *(16.437)*	0.424 *(0.258)*	16.66 *(3.282)*	215 *(101.8)*	58 *(14.5)*	76 *(24.3)*	28.943 *(97.737)*
Standard Power Take-Off Speed (540 rpm)—One Hour								
66.54 *(49.62)*	2015	3.731 *(14.124)*	0.396 *(0.241)*	17.83 *(3.513)*	215 *(101.6)*	57 *(14.0)*	76 *(24.7)*	28.950 *(97.760)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
63.40 *(47.28)*	2474	3.730 *(14.119)*	0.415 *(0.253)*	17.00 *(3.349)*	201 *(93.9)*	58 *(14.4)*	77 *(25.0)*	....
0.00 *(0.00)*	2584	1.219 *(4.615)*	....	....	179 *(81.7)*	58 *(14.4)*	77 *(25.0)*	....
32.55 *(24.27)*	2542	2.375 *(8.989)*	0.515 *(0.313)*	13.71 *(2.700)*	184 *(84.4)*	58 *(14.4)*	78 *(25.6)*	....
73.54 *(54.84)*	2400	4.435 *(16.788)*	0.426 *(0.239)*	16.58 *(3.266)*	210 *(98.9)*	58 *(14.4)*	78 *(25.3)*	....
16.41 *(12.23)*	2562	1.793 *(6.786)*	0.772 *(0.469)*	9.15 *(1.803)*	182 *(83.3)*	58 *(14.4)*	77 *(25.0)*	....
48.35 *(36.05)*	2516	3.003 *(11 369)*	0.439 *(0.267)*	16.10 *(3.171)*	185 *(85.0)*	58 *(14.4)*	77 *(25.0)*	....
Av 39.04 ***Av (29.11)***	**2513**	**2.759** ***(10.444)***	**0.499** ***(0.304)***	**14.15** ***(2.787)***	**190** ***(87.9)***	**58** ***(14.4)***	**77** ***(25.1)***	**28.920** ***(97.659)***

DRAWBAR PERFORMANCE
(Front Wheel Drive Disengaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption			Temp. °F *(°C)*			
					gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 13th (HH-1) Gear											
58.92 *(43.94)*	4093 *(18.20)*	5.40 *(8.69)*	2399	9.35	4.230 *(16.014)*	0.507 *(0.308)*	13.93 *(2.744)*	211 *(99.4)*	61 *(16.1)*	77 *(25.0)*	28.945 *(97.743)*
75% of Pull at Maximum Power—Ten Hours 13th (HH-1) Gear											
48.97 *(36.51)*	3178 *(14.14)*	5.78 *(9.30)*	2490	6.63	3.448 *(13.052)*	0.497 *(0.302)*	14.20 *(2.798)*	188 *(86.7)*	60 *(15.6)*	74 *(23.1)*	28.737 *(97.041)*
50% of Pull at Maximum Power—Two Hours 13th (HH-1) Gear											
34.02 *(25.37)*	2124 *(9.45)*	6.01 *(9.67)*	2532	4.50	2.744 *(10.385)*	0.569 *(0.346)*	12.40 *(2.443)*	183 *(83.9)*	63 *(16.9)*	68 *(19.7)*	28.705 *(96.932)*
50% of Pull at Reduced Engine Speed—Two Hours 14th (HH-2) Gear											
34.00 *(25.36)*	2120 *(9.43)*	6.02 *(9.68)*	2106	4.24	2.443 *(9.246)*	0.507 *(0.309)*	13.92 *(2.742)*	184 *(84.2)*	66 *(18.6)*	82 *(27.5)*	28.660 *(96.781)*
MAXIMUM POWER IN SELECTED GEARS											
47.61 *(35.51)*	6327 *(28.14)*	2.82 *(4.54)*	2471	14.92	11th (HL-3) Gear			184 *(84.2)*	58 *(14.4)*	60 *(15.6)*	28.700 *(96.916)*
58.06 *(43.30)*	5708 *(25.39)*	3.81 *(6.14)*	2400	13.28	12th (HL-4) Gear			196 *(90.8)*	60 *(15.6)*	63 *(17.2)*	28.700 *(96.916)*
61.18 *(45.62)*	4236 *(18.84)*	5.42 *(8.72)*	2400	9.12	13th (HH-1) Gear			198 *(91.9)*	60 *(15.6)*	66 *(18.9)*	28.960 *(97.794)*
61.29 *(45.70)*	3457 *(15.38)*	6.65 *(10.70)*	2400	7.07	14th (HH-2) Gear			202 *(94.4)*	62 *(16.7)*	72 *(22.2)*	28.960 *(97.794)*

LUGGING ABILITY IN 13th (HH-1) GEAR

Crankshaft Speed rpm	2400	2163	1916	1676	1440	1196	959
Pull—lbs *(kN)*	4236 *(18.84)*	4553 *(20.25)*	4709 *(20.94)*	4874 *(21.68)*	4914 *(21.86)*	4948 *(22.01)*	4833 *(21.50)*
Increase in Pull %	0	7	11	15	16	17	14
Power—Hp *(kW)*	61.18 *(45.62)*	58.75 *(43.81)*	53.55 *(39.93)*	48.19 *(35.93)*	41.53 *(30.97)*	34.71 *(25.88)*	27.28 *(20.34)*
Speed—Mph *(km/h)*	5.42 *(8.72)*	4.84 *(7.79)*	4.26 *(6.86)*	3.71 *(5.97)*	3.17 *(5.10)*	2.63 *(4.23)*	2.12 *(3.41)*
Slip %	9.12	10.05	10.51	10.97	11.42	11.42	11.31

Department of Agricultural Engineering

Dates of Test: May 13—27, 1980

Manufacturer: KUBOTA LTD., 22 Funade-cho, 2-chome, Naniwa-ku, Osaka, Japan

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 20-20W **API service classification** SB/SE-CA/CD **To motor** 2.789 gal *(10.556 l)* **Drained from motor** 2.575 gal *(9.746 l)* **Tranmission and hydraulic lubricant** SAE 80 or tractor hydraulic fluid **Front axle lubricant** SAE 80/90 **Total time engine was operated** 39.0 hours.

ENGINE Make Kubota Dsl **Type** four cylinder vertical **Serial No.** V4000-A-1709 **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.134" × 4.528" *(105 mm × 115 mm)* **Compression ratio** 17.0 to 1 **Displacement** 243 cu in *(3983 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element **Oil filter** one full flow cartridge **Fuel filter** one paper cartridge **Muffler** vertical **Cooling medium temperature control** one thermostat

CHASSIS: Type front wheel assist **Serial No.** M7500DT-10536 **Tread width** rear 59.1" *(1500 mm)* to 74.8" *(1900 mm)* front 59.1" *(1500 mm)* **Wheel base** 85.63" *(2175 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 35.2" *(893 mm)* Vertical distance above roadway 41.3" *(1050 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** Selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 0.3 *(0.4)* second 0.3 *(0.6)* third 0.6 *(0.9)* fourth 0.8 *(1.2)* fifth 1.0 *(1.7)* sixth 1.3 *(2.0)* seventh 1.6 *(2.6)* eighth 2.0 *(3.2)* ninth 2.1 *(3.4)* tenth 2.9 *(4.7)* eleventh 3.3 *(5.3)* twelfth 4.5 *(7.3)* thirteenth 6.0 *(9.7)* fourteenth 7.4 *(11.9)* fifteenth 12.4 *(20.0)* sixteenth 17.0 *(27.3)* reverse 0.4 *(0.6)*, 1.4 *(2.2)*, 2.1 *(3.4)*, 8.0 *(12.8)* **Clutch** single dry disc operated by foot pedal **Brakes** multiple wet disc operated by two foot pedals which can be locked together and hand lever **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 133" *(3.38 m)* left 133" *(3.38 m)* (on concrete surface without brake) right 177.2" *(4.50 m)* left 177.2" *(4.50 m)* **Turning space diameter** (on concrete surface with brake applied) right 275.5" *(7.00 m)* left 275.5" *(7.00 m)* (on concrete surface without brake) right 370" *(9.40 m)* left 370" *(9.40 m)* **Power take-off** 540 rpm at 2015 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 165°F *(73.8°C)*. Four gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

TRACTOR SOUND LEVEL WITHOUT CAB	**dB(A)**	**Front Wheel Drive Disengaged dB(A)**
Maximum Available Power—Two Hours	97.0	96.0
75% of Pull at Maximum Power—Ten Hours	–	95.5
50% of Pull at Maximum Power—Two Hours	–	94.0
50% of Pull at Reduced Engine Speed—Two Hours	–	90.0
Bystander in 16th (HH-4) gear	–	89.0

DRAWBAR PERFORMANCE
(Front Wheel Drive Engaged)

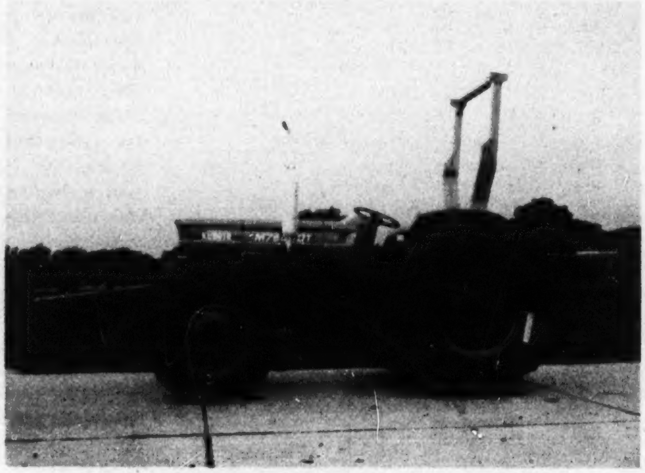
Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 13th (HH-1) Gear											
59.05 *(44.04)*	3913 *(17.40)*	5.66 *(9.11)*	2398	6.10	4.230 *(16.014)*	0.506 *(0.308)*	13.96 *(2.750)*	218 *(103.1)*	65 *(18.1)*	78 *(25.6)*	28.705 *(96.932)*
MAXIMUM POWER IN SELECTED GEARS											
51.68 *(38.54)*	7820 *(34.78)*	2.48 *(3.99)*	2445	14.96	10th (LH-4) Gear			185 *(85.0)*	59 *(15.0)*	62 *(16.7)*	28.700 *(96.916)*
61.69 *(46.01)*	4087 *(18.18)*	5.66 *(9.11)*	2401	6.20	13th (HH-1) Gear			198 *(92.2)*	62 *(16.7)*	70 *(21.1)*	28.960 *(97.794)*
61.17 *(45.62)*	3335 *(14.83)*	6.88 *(11.07)*	2399	5.04	14th (HH-2) Gear			202 *(94.2)*	62 *(16.7)*	70 *(21.1)*	28.960 *(97.794)*

TIRES, BALLAST AND WEIGHT		**With Ballast**	**Without Ballast**
Rear Tires	—No., size, ply & psi *(kPa)*	Two 18.4-28; 6; 16 *(110)*	Two 18.4-28; 6; 16 *(110)*
Ballast	—Liquid (each)	803 lb *(364 kg)*	None
	—Cast Iron (each)	480 lb *(218 kg)*	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 11.2-24; 6; 18 *(125)*	Two 11.2-24; 6; 18 *(125)*
Ballast	—Liquid (each)	242 lb *(110 kg)*	None
	—Cast Iron (each)	240 lb *(109 kg)*	None
Height of Drawbar		21 in *(535 mm)*	21 in *(535 mm)*
Static Weight with Operator	—Rear	6100 lb *(2767 kg)*	3535 lb *(1603 kg)*
	—Front	3410 lb *(1547 kg)*	2445 lb *(1109 kg)*
	—Total	9510 lb *(4314 kg)*	5980 lb *(2712 kg)*

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1549.

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers



The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1350 — JOHN DEERE 2040 DIESEL
8 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption			Temperature °F *(°C)*			
			gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—567 rpm)									
	41.25 *(30.76)*	2500	2.692 *(10.190)*	0.461 *(0.280)*	15.32 *(3.019)*	190 *(87.9)*	66 *(19.1)*	75 *(24.1)*	28.553 *(96.420)*
Standard Power Take-off Speed (540 rpm)—One Hour									
	40.53 *(30.22)*	2382	2.594 *(9.820)*	0.452 *(0.275)*	15.62 *(3.078)*	191 *(88.3)*	67 *(19.4)*	77 *(24.8)*	28.570 *(96.477)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	35.68 *(26.60)*	2546	2.417 *(9.150)*	0.478 *(0.291)*	14.76 *(2.908)*	188 *(86.7)*	67 *(19.4)*	76 *(24.4)*	....
	0.00 *(0.00)*	2620	1.062 *(4.020)*	....	....	181 *(82.8)*	67 *(19.4)*	76 *(24.7)*	....
	18.14 *(13.53)*	2587	1.657 *(6.271)*	0.645 *(0.392)*	10.95 *(2.157)*	184 *(84.4)*	68 *(19.7)*	77 *(25.0)*	....
	40.93 *(30.52)*	2500	2.664 *(10.083)*	0.460 *(0.280)*	15.37 *(3.027)*	190 *(88.1)*	67 *(19.4)*	77 *(25.0)*	....
	9.13 *(6.80)*	2602	1.342 *(5.082)*	1.039 *(0.632)*	6.80 *(1.339)*	182 *(83.3)*	66 *(18.9)*	77 *(25.0)*	....
	27.00 *(20.14)*	2566	2.014 *(7.622)*	0.527 *(0.320)*	13.41 *(2.642)*	187 *(86.1)*	66 *(19.2)*	78 *(25.6)*	....
Av ***Av***	**21.81** ***(16.27)***	**2570**	**1.859** ***(7.038)***	**0.602** ***(0.366)***	**11.73** ***(2.311)***	**185** ***(85.2)***	**67** ***(19.4)***	**77** ***(25.0)***	**28.610** ***(96.612)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption			Temp. °F *(°C)*			
					gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 5th Gear											
31.07 *(23.17)*	2074 *(9.23)*	5.62 *(9.04)*	2496	5.22	2.584 *(9.782)*	0.587 *(0.357)*	12.02 *(2.368)*	189 *(87.2)*	60 *(15.6)*	68 *(20.0)*	28.860 *(97 .456)*
75% of Pull at Maximum Power—Ten Hours 5th Gear											
25.52 *(19.03)*	1646 *(7.32)*	5.81 *(9.36)*	2550	3.98	2.248 *(8.509)*	0.622 *(0.378)*	11.35 *(2.236)*	187 *(85.8)*	62 *(16.6)*	72 *(21.9)*	28.686 *(96.868)*
50% of Pull at Maximum Power—Two Hours 5th Gear											
17.26 *(12.87)*	1098 *(4.89)*	5.89 *(9.48)*	2557	2.88	1.912 *(7.236)*	0.782 *(0.476)*	9.03 *(1.779)*	189 *(86.9)*	72 *(21.9)*	89 *(31.4)*	28.625 *(96.662)*
50% of Pull at Reduced Engine Speed—Two Hours 6th Gear											
17.22 *(12.84)*	1101 *(4.90)*	5.87 *(9.44)*	1779	2.70	1.487 *(5.628)*	0.610 *(0.371)*	11.58 *(2.282)*	189 *(87.2)*	73 *(22.5)*	89 *(31.4)*	28.555 *(96.426)*
MAXIMUM POWER IN SELECTED GEARS											
24.26 *(18.09)*	4873 *(21.68)*	1.87 *(3.00)*	2537	14.89	2nd Gear			186 *(85.3)*	68 *(20.0)*	70 *(21.1)*	28.720 *(96.983)*
31.38 *(23.40)*	4175 *(18.57)*	2.82 *(4.54)*	2497	11.91	3rd Gear			196 *(91.1)*	68 *(20.0)*	78 *(25.6)*	28.690 *(96.882)*
32.11 *(23.94)*	2904 *(12.92)*	4.15 *(6.67)*	2499	7.34	4th Gear			193 *(89.2)*	69 *(20.6)*	77 *(25.0)*	28.700 *(96.916)*
33.31 *(24.84)*	2220 *(9.88)*	5.63 *(9.05)*	2500	5.16	5th Gear			188 *(86.7)*	59 *(15.0)*	65 *(18.3)*	28.890 *(97.557)*
31.38 *(23.40)*	1444 *(6.42)*	8.15 *(13.11)*	2499	3.74	6th Gear			193 *(89.2)*	67 *(19.4)*	79 *(26.1)*	28.690 *(96.882)*

LUGGING ABILITY IN 5th GEAR

Crankshaft Speed rpm	2500	2249	2000	1749	1505	1251	1008
Pull—lbs *(kN)*	2220 *(9.88)*	2361 *(10.50)*	2468 *(10.98)*	2578 *(11.47)*	2652 *(11.79)*	2650 *(11.79)*	2575 *(11.46)*
Increase in Pull %	0	6	11	16	19	19	16
Power—Hp *(kW)*	33.31 *(24.84)*	31.64 *(23.59)*	29.30 *(21.85)*	26.66 *(19.88)*	23.52 *(17.54)*	19.56 *(14.58)*	15.33 *(11.43)*
Speed—Mph *(km/h)*	5.63 *(9.05)*	5.03 *(8.09)*	4.45 *(7.16)*	3.88 *(6.24)*	3.33 *(5.35)*	2.77 *(4.45)*	2.23 *(3.59)*
Slip %	5.16	5.86	6.21	6.55	6.89	6.78	6.66

Department of Agricultural Engineering

Dates of Test: May 27 to June 3, 1980

Manufacturer: JOHN DEERE WERKE MANNHEIM, Mannheim, West Germany

FUEL, OIL AND TIME: **Fuel** No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE 30** **API service classification** SD/CC-CD **To motor** 1.677 gal *(6.347 l)* **Drained from motor** 1.429 gal *(5.409 l)* **Transmission and final drive lubricant** John Deere Hy-Gard **Total time engine was operated** 49.0 hours

ENGINE **Make** John Deere Dsl **Type** three cylinder vertical **Serial No.** 3179DL06 435306CD **Crankshaft** lengthwise **Rated rpm** 2500 **Bore and stroke** 4.19" × 4.33" *(106.5 mm × 110 mm)* **Compression ratio** 16.8 to 1 **Displacement** 179 cu in *(2934 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil **Fuel filter** one paper element and one mesh strainer **Muffler** vertical **Cooling medium temperature control** one thermostat.

CHASSIS: **Type** standard **Serial No.** 2040-369570L **Tread width** rear 53.5" *(1360 mm)* to 73.5" *(1870 mm)* front 49.6" *(1260 mm)* to 79.5" *(2020 mm)* **Wheel base** 74.4" *(1890 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 30.6" *(778 mm)* Vertical distance above roadway 30.9" *(785 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph** ***(km/h)*** first 1.5 *(2.4)* second 2.1 *(3.4)* third 3.2 *(5.1)* fourth 4.4 *(7.1)* fifth 5.8 *(9.4)* sixth 8.3 *(13.4)* seventh 12.4 *(19.9)* eighth 17.3 *(27.8)* reverse 1.7 *(2.8)*, 2.5 *(4.0)*, 3.7 *(5.9)*, 5.1 *(8.2)* **Clutch** single dry disc operated by foot pedal **Brakes** wet disc hydraulically operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 110" *(2.79 m)* left 110" *(2.79 m)* (on concrete surface without brake) right 122" *(3.10 m)* left 122" *(3.10 m)* **Turning space diameter** (on concrete surface with brake applied) right 244" *(6.20 m)* left 244" *(6.20 m)* (on concrete surface without brake) right 268" *(6.81 m)* left 268" *(6.81 m)* **Power take-off** 540 rpm at 2382 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 151°F *(66.1°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

TRACTOR SOUND LEVEL WITHOUT CAB	dB(A)
Maximum Available Power—Two Hours	95.5
75% of Pull at Maximum Power—Ten Hours	95.0
50% of Pull at Maximum Power—Two Hours	95.0
50% of Pull at Reduced Engine Speed—Two Hours	91.0
Bystander in 7th gear	85.5

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 14.9-28; 6; 64 14 *(95)*	Two 14.9-28; 6; 14 *(95)*
Ballast	—Liquid (each)	558 lb *(253 kg)*	None
	—Cast Iron (each)	150 lb *(68 kg)*	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 7.50-16; 6; 36 *(250)*	Two 7.50-16; 6; 36 *(250)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	25 lb *(11 kg)*	None
Height of Drawbar		16.5 in *(420 mm)*	16.5 in *(420 mm)*
Static Weight with Operator	—Rear	4450 lb *(2019 kg)*	3035 lb *(1377 kg)*
	Front	2050 lb *(929 kg)*	2000 lb *(907 kg)*
	Total	6500 lb *(2948 kg)*	5035 lb *(2284 kg)*

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1350.

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

John Deere 2040 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1351 — JOHN DEERE 2940 DIESEL 16 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—1058 rpm)									
	81.17 *(60.53)*	2500	5.232 *(19.806)*	0.455 *(0.277)*	15.51 *(3.056)*	188 *(86.8)*	63 *(17.0)*	76 *(24.4)*	28.703 *(96.927)*
Standard Power Take-off Speed (1000 rpm)—One Hour									
	81.46 *(60.75)*	2407	5.120 *(19.383)*	0.444 *(0.270)*	15.91 *(3.134)*	190 *(87.7)*	63 *(17.2)*	78 *(25.4)*	28.750 *(97.084)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	69.75 *(52.01)*	2529	4.758 *(18.010)*	0.482 *(0.293)*	14.66 *(2.888)*	186 *(85.6)*	63 *(17.2)*	79 *(26.1)*	....
	0.00 *(0.00)*	2632	2.060 *(7.799)*	....	....	178 *(81.1)*	64 *(17.5)*	80 *(26.4)*	....
	35.83 *(26.72)*	2588	3.322 *(12.575)*	0.655 *(0.398)*	10.79 *(2.125)*	182 *(83.6)*	64 *(17.8)*	80 *(26.7)*	....
	81.97 *(61.12)*	2500	5.234 *(19.811)*	0.451 *(0.274)*	15.66 *(3.085)*	190 *(87.8)*	64 *(17.8)*	80 *(26.7)*	....
	18.08 *(13.48)*	2612	2.672 *(10.115)*	1.044 *(0.635)*	6.77 *(1.333)*	178 *(81.4)*	64 *(17.5)*	80 *(26.4)*	....
	52.97 *(39.50)*	2562	4.006 *(15.164)*	0.534 *(0.325)*	13.22 *(2.605)*	184 *(84.4)*	64 *(17.8)*	79 *(26.1)*	....
Av ***Av***	**43.10** ***(32.14)***	**2570**	**3.675** ***(13.913)***	**0.602** ***(0.366)***	**11.73** ***(2.310)***	**183** ***(84.0)***	**64** ***(17.6)***	**80** ***(26.4)***	**28.755** ***(97.161)***

DRAWBAR PERFORMANCE
(Front Wheel Drive Disengaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 9th (5L) Gear											
64.18 *(47.86)*	5144 *(22.88)*	4.68 *(7.53)*	2500	7.33	5.009 *(18.962)*	0.551 *(0.335)*	12.81 *(2.524)*	184 *(84.4)*	66 *(18.9)*	72 *(22.2)*	28.855 *(97.439)*
75% of Pull at Maximum Power—Ten Hours 9th (5L) Gear											
53.03 *(39.54)*	4118 *(18.32)*	4.83 *(7.77)*	2537	5.66	4.453 *(16.858)*	0.593 *(0.361)*	11.91 *(2.346)*	184 *(84.3)*	68 *(20.2)*	79 *(26.1)*	28.864 *(97.469)*
50% of Pull at Maximum Power—Two Hours 9th (5L) Gear											
36.49 *(27.21)*	2734 *(12.16)*	5.01 *(8.06)*	2576	3.60	3.682 *(13.937)*	0.713 *(0.433)*	9.91 *(1.952)*	182 *(83.1)*	68 *(20.0)*	78 *(25.3)*	28.615 *(96.629)*
50% of Pull at Reduced Engine Speed—Two Hours 12th (6H) Gear											
36.57 *(27.27)*	2745 *(12.21)*	5.00 *(8.04)*	1461	3.57	2.637 *(9.983)*	0.509 *(0.310)*	13.87 *(2.732)*	183 *(83.9)*	74 *(23.1)*	83 *(28.3)*	28.755 *(97.101)*
MAXIMUM POWER IN SELECTED GEARS											
51.08 *(38.09)*	7601 *(33.81)*	2.52 *(4.06)*	2534	14.96	5th (3L) Gear			182 *(83.1)*	64 *(17.8)*	70 *(21.1)*	28.540 *(96.375)*
61.17 *(45.61)*	7214 *(32.09)*	3.18 *(5.12)*	2505	14.68	6th (3H) Gear			188 *(86.4)*	68 *(20.0)*	75 *(23.9)*	28.580 *(96.510)*
63.89 *(47.64)*	6951 *(30.92)*	3.45 *(5.55)*	2500	12.56	7th (4L) Gear			187 *(86.1)*	68 *(20.0)*	75 *(23.9)*	28.580 *(96.510)*
67.30 *(50.19)*	5470 *(24.33)*	4.61 *(7.43)*	2500	8.07	8th (4H) Gear			186 *(85.6)*	68 *(20.0)*	75 *(23.9)*	28.570 *(96.477)*
67.98 *(50.69)*	5493 *(24.44)*	4.64 *(7.47)*	2500	8.13	9th (5L) Gear			187 *(85.8)*	67 *(19.4)*	75 *(23.9)*	28.570 *(96.477)*
67.65 *(50.44)*	4195 *(18.66)*	6.05 *(9.73)*	2499	5.75	10th (5H) Gear			186 *(85.6)*	68 *(20.0)*	75 *(23.9)*	28.580 *(96.510)*
67.39 *(50.25)*	3823 *(17.01)*	6.61 *(10.64)*	2500	5.19	11th (6L) Gear			187 *(85.8)*	68 *(20.0)*	75 *(23.9)*	28.590 *(96.544)*
66.50 *(49.59)*	2919 *(12.99)*	8.54 *(13.75)*	2500	3.75	12th (6H) Gear			186 *(85.3)*	68 *(20.0)*	76 *(24.4)*	28.600 *(96.578)*

Department of Agricultural Engineering

Dates of Test: May 27 to June 5, 1980

Manufacturer: JOHN DEERE WERKE MANNHEIM, Mannheim, West Germany

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE 30 API service classification** SD/CC-CD **To motor** 2.866 gal *(10.848 l)* **Drained from motor** 2.596 gal *(9.826 l)* **Transmission and final drive lubricant** John Deere Hy-Gard **Front axle lubricant** SAE 90 **Total time engine was operated** 43.0 hours

ENGINE Make John Deere Dsl **Type** six cylinder vertical **Serial No.** 6359DL03 447805CD **Crankshaft** lengthwise **Rated rpm** 2500 **Bore and stroke** 4.19" × 4.33" *(106.5 mm × 110 mm)* **Compression ratio** 16.8 to 1 **Displacement** 359 cu in *(5883 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** one paper element and one mesh strainer **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** two thermostats.

CHASSIS: Type front wheel assist **Serial No.** 2940-374919L **Tread width** rear 63" *(1610 mm)* to 91" *(2300 mm)* front 67" *(1700 mm)* to 71" *(1800 mm)* **Wheel base** 101.6" *(2580 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 32.4" *(822 mm)* Vertical distance above roadway 40" *(1016 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled power shift **Advertised speeds mph** *(km/h)* first 1.5 *(2.3)* second 1.9 *(3.0)* third 2.0 *(3.2)* fourth 2.6 *(4.1)* fifth 2.9 *(4.6)* sixth 3.7 *(5.9)* seventh 3.9 *(6.2)* eighth 4.9 *(8.0)* ninth 5.0 *(8.0)* tenth 6.3 *(10.2)* eleventh 6.9 *(11.0)* twelfth 8.7 *(14.0)* thirteenth 9.9 *(15.9)* fourteenth 12.6 *(20.2)* fifteenth 13.3 *(21.4)* sixteenth 16.9 *(27.3)* reverse 2.3 *(3.7)*, 2.8 *(4.6)*, 3.1 *(5.0)*, 4.0 *(6.3)* ,4.4 *(7.1)*, 5.6 *(9.1)*, 6.0 *(9.6)*, 7.8 *(12.5)* **Clutch** single dry disc operated by foot pedal **Brakes** wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 175" *(4.45 m)* left 175" *(4.45 m)* (on concrete surface without brake) right 209" *(5.30 m)* left 209" *(5.30 m)* **Turning space diameter** (on concrete surface with brake applied) right 367" *(9.32 m)* left 367" *(9.32 m)* (on concrete surface without brake) right 435" *(11.05 m)* left 435" *(11.05 m)* **Power take-off** 1000 rpm at 2407 engine rpm and 540 at 2414 engine rpm.

LUGGING ABILITY IN 9th (5L) GEAR

Crankshaft Speed rpm	2500	2249	2004	1749	1503	1252
Pull—lbs *(kN)*	5493 *(24.44)*	5938 *(26.41)*	6306 *(28.05)*	6557 *(29.17)*	6812 *(30.30)*	6767 *(30.10)*
Increase in Pull %	0	8	15	19	24	23
Power—Hp *(kW)*	67.98 *(50.69)*	65.35 *(48.73)*	61.02 *(45.50)*	54.70 *(40.79)*	48.30 *(36.02)*	39.98 *(29.81)*
Speed—Mph *(km/h)*	4.64 *(7.47)*	4.13 *(6.64)*	3.63 *(5.84)*	3.13 *(5.03)*	2.66 *(4.28)*	2.22 *(3.57)*
Slip %	8.13	8.99	10.28	11.28	12.26	12.13

TRACTOR SOUND LEVEL WITHOUT CAB	dB(A)	Front Wheel Drive Disengaged dB(A)
Maximum Available Power—Two Hours	94.0	94.0
75% of Pull at Maximum Power—Ten Hours	–	93.0
50% of Pull at Maximum Power—Two Hours	–	93.0
50% of Pull at Reduced Engine Speed—Two Hours	–	88.5
Bystander in 16th (8H) gear	–	86.5

DRAWBAR PERFORMANCE
(Front Wheel Drive Engaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 9th (5L) Gear											
65.57 *(48.90)*	5107 *(22.72)*	4.82 *(7.75)*	2500	5.01	5.027 *(19.029)*	0.541 *(0.329)*	13.04 *(2.570)*	186 *(85.3)*	70 *(21.1)*	77 *(24.7)*	28.820 *(97.321)*
MAXIMUM POWER IN SELECTED GEARS											
56.49 *(42.13)*	9485 *(42.19)*	2.23 *(3.59)*	2522	14.87	4th (2H) Gear			183 *(83.6)*	64 *(17.8)*	69 *(20.6)*	28.550 *(96.409)*
69.20 *(51.61)*	5412 *(24.07)*	4.80 *(7.72)*	2500	5.44	9th (5L) Gear			186 *(85.3)*	66 *(18.9)*	73 *(22.8)*	28.550 *(96.409)*

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 18.4-34; 8; 16 *(110)*	Two 18.4-34; 8; 16 *(110)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	303 lb *(137 kg)*	None
Front Tires	—No., [illegible], ply & psi *(kPa)*	Two 13.6-24; 8; 14 *(95)*	Two 13.6-24; 8; 14 *(95)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	305 lb *(138 kg)*	None
Height of Drawbar		19.5 in *(495 mm)*	19.5 in *(495 mm)*
Static Weight with Operator—Rear		7090 lb *(3216 kg)*	6485 lb *(2942 kg)*
Front		3560 lb *(1615 kg)*	2950 lb *(1338 kg)*
Total		10650 lb *(4831 kg)*	9435 lb *(4280 kg)*

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 151°F *(66.3°C)*. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1351.**

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

John Deere 2940 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1352 — HESSTON FIAT 680 DT DIESEL
ALSO HESSTON FIAT 680 DIESEL
8 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—1038 rpm)									
	62.47 *(46.58)*	2500	3.634 *(13.757)*	0.411 *(0.250)*	17.19 *(3.386)*	191 *(88.3)*	68 *(20.0)*	75 *(23.9)*	28.863 *(97.467)*
Standard Power Take-Off Speed (1000 rpm)—One Hour									
	61.20 *(45.64)*	2408	3.517 *(13.315)*	0.406 *(0.247)*	17.40 *(3.428)*	191 *(88.2)*	67 *(19.6)*	75 *(23.7)*	28.865 *(97.473)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	55.45 *(41.35)*	2612	3.258 *(12.334)*	0.415 *(0.252)*	17.02 *(3.353)*	185 *(85.0)*	68 *(19.7)*	75 *(23.9)*	....
	0.00 *(0.00)*	2782	1.100 *(4.165)*	....	....	168 *(75.6)*	67 *(19.4)*	74 *(23.6)*	....
	28.70 *(21.40)*	2703	2.111 *(7.992)*	0.520 *(0.316)*	13.59 *(2.678)*	174 *(78.6)*	68 *(19.7)*	75 *(23.9)*	....
	62.68 *(46.74)*	2500	3.641 *(13.781)*	0.410 *(0.250)*	17.22 *(3.391)*	193 *(89.4)*	67 *(19.4)*	75 *(23.9)*	....
	14.64 *(10.92)*	2754	1.602 *(6.062)*	0.772 *(0.470)*	9.14 *(1.801)*	169 *(76.1)*	67 *(19.4)*	75 *(23.9)*	....
	42.38 *(31.60)*	2659	2.651 *(10.034)*	0.442 *(0.269)*	15.99 *(3.149)*	180 *(82.5)*	68 *(20.3)*	75 *(23.9)*	....
Av ***Av***	**33.97** ***(25.34)***	**2668**	**2.394** ***(9.062)***	**0.498** ***(0.303)***	**14.19** ***(2.796)***	**178** ***(81.2)***	**67** ***(19.7)***	**75** ***(23.8)***	**28.870** ***(97.490)***

DRAWBAR PERFORMANCE
(Front Wheel Drive Disengaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 5th (1 H) Gear											
52.93 *(39.47)*	3654 *(16.25)*	5.43 *(8.74)*	2500	5.63	3.575 *(13.535)*	0.477 *(0.290)*	14.80 *(2.916)*	193 *(89.2)*	66 *(18.9)*	74 *(23.3)*	28.815 *(97.304)*
75% of Pull at Maximum Power—Ten Hours 5th (1 H) Gear											
42.48 *(31.67)*	2769 *(12.32)*	5.75 *(9.26)*	2610	4.34	2.991 *(11.324)*	0.497 *(0.303)*	14.20 *(2.797)*	191 *(88.3)*	75 *(23.7)*	85 *(29.2)*	28.621 *(96.649)*
50% of Pull at Maximum Power—Two Hours 5th (1 H) Gear											
29.54 *(22.03)*	1853 *(8.24)*	5.98 *(9.62)*	2675	2.91	2.372 *(8.978)*	0.567 *(0.345)*	12.45 *(2.453)*	185 *(85.0)*	75 *(23.6)*	87 *(30.6)*	28.610 *(96.612)*
50% of Pull at Reduced Engine Speed—Two Hours 6th (2 H) Gear											
29.64 *(22.10)*	1858 *(8.27)*	5.98 *(9.63)*	1856	2.98	2.000 *(7.571)*	0.477 *(0.290)*	14.82 *(2.919)*	190 *(87.8)*	78 *(25.3)*	92 *(33.3)*	28.600 *(96.578)*
MAXIMUM POWER IN SELECTED GEARS											
49.65 *(37.02)*	6252 *(27.81)*	2.98 *(4.79)*	2541	14.68		3rd (3 L) Gear		191 *(88.3)*	66 *(18.9)*	72 *(22.2)*	28.750 *(97.084)*
52.42 *(39.09)*	4796 *(21.34)*	4.10 *(6.60)*	2501	7.88		4th (4 L) Gear		195 *(90.6)*	74 *(23.3)*	82 *(27.8)*	28.630 *(96.679)*
53.65 *(40.01)*	3697 *(16.45)*	5.44 *(8.76)*	2500	5.53		5th (1 H) Gear		198 *(91.9)*	73 *(22.8)*	79 *(26.1)*	28.620 *(96.645)*
52.35 *(39.03)*	2454 *(10.92)*	8.00 *(12.87)*	2501	3.77		6th (2 H) Gear		196 *(91.1)*	74 *(23.3)*	84 *(28.9)*	28.610 *(96.612)*

LUGGING ABILITY IN 5th (1 H) GEAR

Crankshaft Speed rpm	2500	2253	2001	1750	1503	1256
Pull—lbs *(kN)*	3697 *(16.45)*	3818 *(16.98)*	3947 *(17.56)*	3973 *(17.67)*	3972 *(17.67)*	3803 *(16.91)*
Increase in Pull %	0	3	7	7	7	3
Power—Hp *(kW)*	53.65 *(40.01)*	49.80 *(37.14)*	45.61 *(34.01)*	40.13 *(29.92)*	34.44 *(25.68)*	27.62 *(20.60)*
Speed—Mph *(km/h)*	5.44 *(8.76)*	4.89 *(7.87)*	4.33 *(6.97)*	3.79 *(6.10)*	3.25 *(5.23)*	2.72 *(4.38)*
Slip %	5.53	6.80	5.94	[illegible]	6.09	5.94

Department of Agricultural Engineering

Dates of Test: May 30—June 10, 1980

Manufacturer: FIAT TRATTORI S.p.A. Via Pico della Mirandola 72-41100 Modena, Italy

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 20W-40 **API service classification** Mil-L-2104B EP **To motor** 2.538 gal *(9.606 l)* **Drained from motor** 2.361 gal *(8.936 l)* **Transmission and final drive lubricant** Oliofiat AF 87 **Front axle lubricant** Oliofiat AMBRA 20W-40 **Total time engine was operated** 42.5 hours.

ENGINE Make Fiat Dsl **Type** four cylinder vertical **Serial No.** 8045-02-270-00-1598 **Crankshaft** lengthwise **Rated rpm** 2500 **Bore and stroke** 3.937" × 4.331" *(100 mm × 110 mm)* **Compression ratio** 17.0 to 1 **Displacement** 211 cu in *(3456 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow paper cartridge **Fuel filter** two paper cartridges and one gauze screen **Muffler** vertical **Cooling medium temperature control** one thermostat

CHASSIS: Type front wheel assist **Serial No.** 680DT/8-036386 **Tread width** rear 59.1" *(1500 mm)* to 76.0" *(1930 mm)* front 55.1" *(1400 mm)* to 82.7" *(2100 mm)* **Wheel base** 89.8" *(2280 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.3" *(794 mm)* Vertical distance above roadway 36.3" *(922 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** Selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 1.6 *(2.5)* second 2.3 *(3.7)* third 3.4 *(5.5)* fourth 4.4 *(7.1)* fifth 5.7 *(9.2)* sixth 8.2 *(13.2)* seventh 12.3 *(19.8)* eighth 15.9 *(25.6)* reverse 2.1 *(3.3)*, 7.4 *(11.9)* **Clutch** dual dry disc operated by foot pedal **Brakes** wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 191" *(4.85 m)* left 189" *(4.80 m)* (on concrete surface without brake) right 214" *(5.44 m)* left 213" *(5.41 m)* **Turning space diameter** (on concrete surface with brake applied) right 393" *(9.98 m)* left 389" *(9.88 m)* (on concrete surface without brake) right 438" *(11.13 m)* left 436" *(11.07 m)* **Power take-off** 1000 rpm at 2408 engine rpm and 540 rpm at 2230 engine rpm.

REPAIRS and ADJUSTMENTS: The hydraulic hitch control level linkage required adjustment following the drawbar tests.

TRACTOR SOUND LEVEL WITH CAB	dB(A)	Front Wheel Drive Disengaged dB(A)
Maximum Available Power—Two Hours	84.0	83.0
75% of Pull at Maximum Power—Ten Hours	–	81.5
50% of Pull at Maximum Power—Two Hours	–	81.5
50% of Pull at Reduced Engine Speed—Two Hours	–	78.5
Bystander in 8th (4 H) gear	–	87.0

DRAWBAR PERFORMANCE
(Front Wheel Drive Engaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F (°C) Cool-ing med	Temp. °F (°C) Air wet bulb	Temp. °F (°C) Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 5th (1 H) Gear											
53.33 *(39.77)*	3571 *(15.88)*	5.60 *(9.01)*	2500	3.81	3.593 *(13.602)*	0.476 *(0.289)*	14.84 *(2.924)*	194 *(90.0)*	66 *(18.6)*	75 *(23.9)*	28.925 *(97.675)*
MAXIMUM POWER IN SELECTED GEARS											
48.88 *(36.45)*	8923 *(39.69)*	2.05 *(3.31)*	2586	14.88	2nd (2 L) Gear			185 *(84.7)*	66 *(18.9)*	71 *(21.7)*	28.750 *(97.084)*
53.76 *(40.09)*	4693 *(20.88)*	4.30 *(6.91)*	2503	4.67	4th (4 L) Gear			197 *(91.4)*	74 *(23.3)*	83 *(28.3)*	28.620 *(96.645)*
54.87 *(40.92)*	3674 *(16.34)*	5.60 *(9.01)*	2500	3.81	5th (1 H) Gear			194 *(90.0)*	66 *(18.9)*	75 *(23.9)*	28.910 *(97.625)*

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 13.6R38; 6; 22 *(150)*	Two 13.6R38; 6; 22 *(150)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	588 lb *(267 kg)*	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 11.2R28; 8; 24 *(165)*	Two 11.2R28; 8; 24 *(165)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	743 lb *(337 kg)*	None
Height of Drawbar		21 in *(535 mm)*	21 in *(535 mm)*
Static Weight with Operator	—Rear	5950 lb *(2699 kg)*	4775 lb *(2166 kg)*
	—Front	4050 lb *(1837 kg)*	2565 lb *(1163 kg)*
	—Total	10000 lb *(4536 kg)*	7340 lb *(3329 kg)*

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump return was 143°F *(61.6°C)*. Four gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1352.**

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

Hesston Fiat 680 DT Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1353 — HESSTON FIAT 880 DT-5 DIESEL
ALSO HESTON FIAT 880-5 DIESEL
12 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—1038 rpm)									
	81.32 *(60.64)*	2500	5.070 *(19.192)*	0.440 *(0.268)*	16.04 *(3.160)*	187 *(86.2)*	62 *(16.8)*	75 *(23.9)*	29.140 *(98.401)*
Standard Power Take-Off Speed (1000 rpm)—One Hour									
	80.95 *(60.37)*	2410	4.975 *(18.831)*	0.434 *(0.264)*	16.27 *(3.206)*	188 *(86.6)*	62 *(16.7)*	75 *(23.9)*	29.120 *(98.334)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	70.80 *(52.80)*	2558	4.410 *(16.692)*	0.440 *(0.268)*	16.06 *(3.163)*	178 *(81.4)*	62 *(16.7)*	75 *(23.9)*	....
	0.00 *(0.00)*	2717	1.542 *(5.837)*	....	....	164 *(73.6)*	62 *(16.7)*	74 *(23.3)*	....
	36.25 *(27.03)*	2618	2.825 *(10.694)*	0.550 *(0.335)*	12.83 *(2.528)*	170 *(76.7)*	62 *(16.7)*	74 *(23.6)*	....
	81.23 *(60.57)*	2500	5.081 *(19.233)*	0.442 *(0.269)*	15.99 *(3.150)*	188 *(86.7)*	62 *(16.9)*	75 *(23.9)*	....
	18.57 *(13.85)*	2683	2.234 *(8.458)*	0.850 *(0.517)*	8.31 *(1.637)*	165 *(73.9)*	62 *(16.7)*	74 *(23.6)*	....
	53.35 *(39.78)*	2572	3.577 *(13.540)*	0.473 *(0.288)*	14.92 *(2.938)*	178 *(80.8)*	63 *(17.2)*	75 *(23.9)*	....
Av ***Av***	**43.37** ***(32.34)***	**2608**	**3.278** ***(12.409)***	**0.534** ***(0.325)***	**13.23** ***(2.606)***	**174** ***(78.8)***	**62** ***(16.8)***	**75** ***(23.7)***	**29.113** ***(98.311)***

DRAWBAR PERFORMANCE
(Front Wheel Drive Disengaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 8th (4 N) Gear											
67.64 *(50.44)*	4857 *(21.61)*	5.22 *(8.40)*	2500	6.57	5.009 *(18.962)*	0.523 *(0.318)*	13.50 *(2.660)*	183 *(83.9)*	64 *(17.8)*	76 *(24.2)*	29.015 *(97.979)*
75% of Pull at Maximum Power—Ten Hours 8th (4 N) Gear											
55.33 *(41.26)*	3789 *(16.85)*	5.48 *(8.81)*	2576	4.93	4.117 *(15.585)*	0.525 *(0.320)*	13.44 *(2.648)*	180 *(82.2)*	62 *(16.7)*	81 *(27.1)*	28.951 *(97.763)*
50% of Pull at Maximum Power—Two Hours 8th (4 N) Gear											
38.14 *(28.44)*	2541 *(11.30)*	5.63 *(9.06)*	2606	3.33	3.275 *(12.396)*	0.606 *(0.369)*	11.65 *(2.295)*	173 *(78.1)*	60 *(15.3)*	81 *(26.9)*	29.000 *(97.929)*
50% of Pull at Reduced Engine Speed—Two Hours 9th (1 H) Gear											
37.90 *(28.26)*	2529 *(11.25)*	5.62 *(9.04)*	1822	3.52	2.620 *(9.916)*	0.488 *(0.297)*	14.47 *(2.850)*	175 *(79.2)*	67 *(19.2)*	88 *(30.8)*	28.995 *(97.912)*
MAXIMUM POWER IN SELECTED GEARS											
62.73 *(46.78)*	7554 *(33.60)*	3.11 *(5.01)*	2558	14.87	6th (2 N) Gear			177 *(80.6)*	60 *(15.6)*	69 *(20.6)*	29.020 *(97.996)*
68.12 *(50.80)*	6380 *(28.38)*	4.00 *(6.44)*	2498	10.25	7th (3 N) Gear			186 *(85.6)*	58 *(14.4)*	78 *(25.6)*	29.050 *(98.097)*
70.27 *(52.40)*	5053 *(22.48)*	5.21 *(8.39)*	2500	6.67	8th (4 N) Gear			185 *(85.0)*	58 *(14.4)*	75 *(23.9)*	29.080 *(98.199)*
70.73 *(52.74)*	3476 *(15.46)*	7.63 *(12.28)*	2499	4.45	9th (1 H) Gear			187 *(86.1)*	59 *(15.0)*	79 *(26.1)*	29.040 *(98.064)*
69.36 *(51.72)*	2581 *(11.48)*	10.08 *(16.22)*	2500	3.26	10th (2 H) Gear			184 *(84.2)*	58 *(14.4)*	79 *(26.1)*	29.030 *(98.030)*

Department of Agricultural Engineering

Dates of Test: May 30—June 12, 1980

Manufacturer: FIAT TRATTORI S.p.A. Via Pico della Mirandola 72-41100 Modena, Italy

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 20W-40 **API service classification** Mil-L-2104B EP **To motor** 2.847 gal *(10.776 l)* **Drained from motor** 2.755 gal *(10.428 l)* **Transmission and final drive lubricant** Oliofiat AF 87 **Front axle lubricant** Oliofiat AMBRA 20W-40 **Total time engine was operated** 43.0 hours.

ENGINE Make Fiat Dsl **Type** five cylinder vertical **Serial No.** 8055-04-200-00-0005 **Crankshaft** lengthwise **Rated rpm** 2500 **Bore and stroke** 4.055" × 4.331" *(103 mm × 110 mm)* **Compression ratio** 17 to 1 **Displacement** 280 cu in *(4580 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** two full flow paper cartridges **Fuel filter** two paper cartridges and one gauze screen **Muffler** vertical **Cooling medium temperature control** one thermostat

CHASSIS: Type front wheel assist **Serial No.** 880DT/12/2-893199 **Tread width** rear 59.1" *(1500 mm)* to 86.6" *(2200 mm)* front 67.3" *(1710 mm)* to 84.4" *(2145 mm)* **Wheel base** 95.3" *(2420 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 35.0" *(890 mm)* Vertical distance above roadway 36.7" *(933 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** Selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 0.9 *(1.5)* second 1.2 *(2.0)* third 1.5 *(2.4)* fourth 1.9 *(3.1)* fifth 2.7 *(4.4)* sixth 3.5 *(5.7)* seventh 4.4 *(7.1)* eighth 5.5 *(8.9)* ninth 7.9 *(12.7)* tenth 10.3 *(16.6)* eleventh 12.9 *(20.7)* twelfth 16.1 *(25.9)* reverse 0.9 *(1.4)*, 2.6 *(4.1)*, 7.5 *(12.0)* **Clutch** dual dry disc operated by foot pedal **Brakes** wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 197" *(5.00 m)* left 200" *(5.08 m)* (on concrete surface without brake) right 228" *(5.79 m)* left 232" *(5.89 m)* **Turning space diameter** (on concrete surface with brake applied) right 406" *(10.31 m)* left 412" *(10.46 m)* (on concrete surface without brake) right 468" *(11.89 m)* left 476" *(12.09 m)* **Power take-off** 1000 rpm at 2410 engine rpm and 540 rpm at 2125 engine rpm.

LUGGING ABILITY IN 8th (4 N) GEAR

Crankshaft Speed rpm	2500	2252	1997	1746	1493	1246	995
Pull—lbs *(kN)*	5053 *(22.48)*	5464 *(24.30)*	5660 *(25.18)*	5800 *(25.80)*	5864 *(26.08)*	5903 *(26.26)*	5303 *(23.59)*
Increase in Pull %	0	8	12	15	16	17	5
Power—Hp *(kW)*	70.27 *(52.40)*	67.83 *(50.58)*	62.06 *(46.27)*	55.32 *(41.25)*	47.69 *(35.56)*	39.97 *(29.81)*	29.11 *(21.70)*
Speed—Mph *(km/h)*	5.21 *(8.39)*	4.66 *(7.49)*	4.11 *(6.62)*	3.58 *(5.76)*	3.05 *(4.91)*	2.54 *(4.09)*	2.06 *(3.31)*
Slip %	6.67	7.51	7.78	8.46	8.60	8.73	7.51

TRACTOR SOUND LEVEL WITH CAB	dB(A)	Front Wheel Drive Disengaged dB(A)
Maximum Available Power—Two Hours	84.5	87.5
75% of Pull at Maximum Power—Ten Hours	–	85.5
50% of Pull at Maximum Power—Two Hours	–	84.0
50% of Pull at Reduced Engine Speed—Two Hours	–	80.0
Bystander in 12th (4 H) gear	–	88.5

DRAWBAR PERFORMANCE
(Front Wheel Drive Engaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 8th (4 N) Gear											
67.78 *(50.54)*	4685 *(20.84)*	5.42 *(8.73)*	2499	4.46	4.956 *(18.761)*	0.516 *(0.314)*	13.68 *(2.694)*	188 *(86.4)*	68 *(20.0)*	85 *(29.2)*	29.015 *(97.979)*
MAXIMUM POWER IN SELECTED GEARS											
48.25 *(35.98)*	10598 *(47.14)*	1.71 *(2.75)*	2578	14.97	4th (4 L) Gear			170 *(76.7)*	59 *(15.0)*	67 *(19.4)*	29.030 *(98.030)*
70.62 *(52.66)*	6185 *(27.51)*	4.28 *(6.89)*	2500	5.72	7th (3 N) Gear			186 *(85.6)*	58 *(14.4)*	77 *(25.0)*	29.050 *(98.057)*
70.35 *(52.46)*	4857 *(21.60)*	5.43 *(8.74)*	2499	4.24	8th (4 N) Gear			186 *(85.3)*	58 *(14.4)*	76 *(24.4)*	29.060 *(98.131)*

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 18.4R34; 8; 20 *(140)*	Two 18.4R34; 8; 20 *(140)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	618 lb *(280 kg)*	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 12.4R28; 8; 26 *(180)*	Two 12.4R28; 8; 26 *(180)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	788 lb *(357 kg)*	None
Height of Drawbar		22.5 in *(570 mm)*	22.5 in *(570 mm)*
Static Weight with Operator	—Rear	6755 lb *(3064 kg)*	5520 lb *(2504 kg)*
	—Front	4805 lb *(2180 kg)*	3230 lb *(1465 kg)*
	—Total	11560 lb *(5244 kg)*	8750 lb *(3969 kg)*

REPAIRS and ADJUSTMENTS: The manuall operated governor control linkage required ad justment during the drawbar tests.

REMARKS: All test results were determine from observed data obtained in accordance wit SAE and ASAE test code or official Nebraska tes procedure. Temperature at injection pump re turn was 151°F *(65.9°C)*. Five gears were chose between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a tru and correct report of official Tractor Test 1353.

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineer

Hesston Fiat 880 DT-5 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1354 — HESSTON FIAT 980 DT DIESEL
ALSO HESTON FIAT 980 DIESEL
16 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp (kW)	Crank shaft speed rpm	Fuel Consumption gal/hr (l/h)	Fuel Consumption lb/hp.hr (kg/kW.h)	Fuel Consumption Hp.hr/gal (kW.h/l)	Temperature °F (°C) Cooling medium	Temperature °F (°C) Air wet bulb	Temperature °F (°C) Air dry bulb	Barometer inch Hg (kPa)
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours (PTO Speed—996 rpm)									
	91.12 *(67.95)*	2400	5.392 *(20.412)*	0.418 *(0.254)*	16.90 *(3.329)*	195 *(90.7)*	62 *(16.6)*	75 *(23.8)*	28.943 *(97.737)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
	81.48 *(60.76)*	2521	4.936 *(18.686)*	0.428 *(0.260)*	16.51 *(3.252)*	189 *(87.2)*	61 *(16.1)*	74 *(23.3)*	....
	0.00 *(0.00)*	2682	1.623 *(6.143)*	....	....	177 *(80.6)*	62 *(16.4)*	74 *(23.6)*	....
	42.05 *(31.36)*	2610	3.127 *(11.835)*	0.525 *(0.319)*	13.45 *(2.649)*	182 *(83.1)*	62 *(16.7)*	76 *(24.4)*	....
	91.70 *(68.38)*	2400	5.395 *(20.423)*	0.415 *(0.253)*	17.00 *(3.348)*	192 *(88.9)*	62 *(16.7)*	76 *(24.4)*	....
	21.49 *(16.02)*	2652	2.370 *(8.973)*	0.779 *(0.474)*	9.06 *(1.786)*	177 *(80.6)*	62 *(16.7)*	76 *(24.7)*	....
	61.95 *(46.20)*	2559	4.010 *(15.180)*	0.457 *(0.278)*	15.45 *(3.043)*	188 *(86.9)*	62 *(16.7)*	78 *(25.3)*	....
Av ***Av***	**49.78** ***(37.12)***	**2570**	**3.577** ***(13.540)***	**0.507** ***(0.309)***	**13.92** ***(2.741)***	**184** ***(84.5)***	**62** ***(16.5)***	**76** ***(24.3)***	**28.953** ***(97.771)***

DRAWBAR PERFORMANCE
(Front Wheel Drive Disengaged)

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr (l/h)	Fuel Consumption lb/hp.hr (kg/kW.h)	Fuel Consumption Hp.hr/gal (kW.h/l)	Temp. °F (°C) Cooling med	Temp. °F (°C) Air wet bulb	Temp. °F (°C) Air dry bulb	Barom. inch Hg (kPa)
Maximum Available Power—Two Hours 12th (4 N) Gear											
74.93 *(55.87)*	5633 *(25.06)*	4.99 *(8.03)*	2400	7.11	5.257 *(19.900)*	0.495 *(0.301)*	14.25 *(2.808)*	193 *(89.2)*	57 *(13.9)*	65 *(18.1)*	29.105 *(98.283)*
75% of Pull at Maximum Power—Ten Hours 12th (4 N) Gear											
62.30 *(46.46)*	4363 *(19.41)*	5.36 *(8.62)*	2530	5.39	4.584 *(17.354)*	0.520 *(0.316)*	13.59 *(2.677)*	198 *(92.1)*	72 *(22.4)*	87 *(30.3)*	28.715 *(96.966)*
50% of Pull at Maximum Power—Two Hours 12th (4 N) Gear											
43.15 *(32.18)*	2906 *(12.93)*	5.57 *(8.96)*	2583	3.65	3.522 *(13.332)*	0.576 *(0.351)*	12.25 *(2.413)*	190 *(87.8)*	70 *(20.8)*	83 *(28.1)*	28.840 *(97.388)*
50% of Pull at Reduced Engine Speed—Two Hours 13th (1 H) Gear											
43.02 *(32.08)*	2913 *(12.96)*	5.54 *(8.91)*	1797	3.61	2.991 *(11.324)*	0.491 *(0.299)*	14.36 *(2.833)*	192 *(88.9)*	71 *(21.4)*	84 *(28.9)*	28.790 *(97.220)*

MAXIMUM POWER IN SELECTED GEARS

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank-shaft speed rpm	Slip %	Gear	Cooling med	Air wet bulb	Air dry bulb	Barom. inch Hg (kPa)
68.29 *(50.92)*	8351 *(37.15)*	3.07 *(4.93)*	2511	14.65	10th (2 N) Gear	188 *(86.4)*	57 *(13.9)*	60 *(15.6)*	29.080 *(98.199)*
73.58 *(54.87)*	7218 *(32.11)*	3.82 *(6.15)*	2399	11.04	11th (3 N) Gear	199 *(92.8)*	6[illegible] *(20.0)*	77 *(25.0)*	28.850 *(97.422)*
77.42 *(57.74)*	5812 *(25.85)*	5.00 *(8.04)*	2398	6.83	12th (4 N) Gear	198 *(91.9)*	68 *(20.0)*	77 *(25.0)*	28.850 *(97.422)*
77.34 *(57.67)*	3967 *(17.65)*	7.31 *(11.77)*	2400	4.61	13th (1 H) Gear	202 *(94.2)*	68 *(20.0)*	77 *(25.0)*	28.850 *(97.422)*
75.83 *(56.54)*	2946 *(13.11)*	9.65 *(15.53)*	2402	3.65	14th (2 H) Gear	197 *(91.7)*	69 *(20.6)*	80 *(26.7)*	28.850 *(97.422)*

LUGGING ABILITY IN 12th (4 N) GEAR

Crankshaft Speed rpm	2398	2162	1915	1689	1432	1194	954
Pull—lbs *(kN)*	5812 *(25.85)*	6113 *(27.19)*	6193 *(27.55)*	6159 *(27.40)*	6166 *(27.43)*	6439 *(28.64)*	5779 *(25.71)*
Increase in Pull %	0	5	7	6	6	11	–1
Power—Hp *(kW)*	77.42 *(57.74)*	72.83 *(54.31)*	65.25 *(48.65)*	57.24 *(42.69)*	48.56 *(36.21)*	42.02 *(31.34)*	30.52 *(22.76)*
Speed—Mph *(km/h)*	5.00 *(8.04)*	4.47 *(7.19)*	3.95 *(6.36)*	3.49 *(5.61)*	2.95 *(4.75)*	2.45 *(3.94)*	1.98 *(3.19)*
Slip %	6.83	7.53	7.80	7.80	7.66	8.48	7.11

Department of Agricultural Engineering

Dates of Test: June 2-17, 1980

Manufacturer: FIAT TRATTORI S.p.A. Via Pico della Mirandola 72-41100 Modena, Italy

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60° *(15°/15°)*** 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 20W-40 **API service classification** Mil-L-2104B EP **To motor** 2.987 gal *(11.306 l)* **Drained from motor** 2.646 gal *(10.015 l)* **Transmission and final drive lubricant** Oliofiat AF 87 **Front axle lubricant** Oliofiat AMBRA 20W-40 **Total time engine was operated** 48.0 hours.

ENGINE Make Fiat Diesel **Type** six cylinder vertical **Serial No.** 8065-02*217-996175* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 3.937" × 4.33" *(100 mm × 110 mm)* **Compression ratio** 17 to 1 **Displacement** 316 cu in *(5178 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** two full flow paper cartridges **Fuel filter** two paper cartridges and one gauze screen **Muffler** vertical **Cooling medium temperature control** one thermostat

CHASSIS: Type front wheel assist **Serial No.** 980DT/16*702457* **Tread width** rear 59.1" *(1500 mm)* to 86.6" *(2200 mm)* front 67.3" *(1710 mm)* to 84.6" *(2150 mm)* **Wheel base** 99.6" *(2530 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 38.4" *(975 mm)* Vertical distance above roadway 37.8" *(960 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** Selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 0.3 *(0.5)* second 0.4 *(0.6)* third 0.5 *(0.8)* fourth 0.6 *(1.0)* fifth 0.9 *(1.4)* sixth 1.2 *(1.9)* seventh 1.4 *(2.3)* eighth 1.8 *(2.9)* ninth 2.6 *(4.2)* tenth 3.4 *(5.5)* eleventh 4.2 *(6.8)* twelfth 5.3 *(8.5)* thirteenth 7.6 *(12.2)* fourteenth 9.9 *(15.9)* fifteenth 12.4 *(19.9)* sixteenth 15.5 *(24.9)* reverse 0.3 *(0.5)*, 0.9 *(1.4)*, 2.5 *(4.0)*, 7.2 *(11.5)* **Clutch** dual dry disc operated by foot pedal **Brakes** wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 201" *(5.11 m)* left 201" *(5.11 m)* (on concrete surface without brake) right 232" *(5.89 m)* left 230" *(5.84 m)* **Turning space diameter** (on concrete surface with brake applied) right 414" *(10.51 m)* left 414" *(10.51 m)* (on concrete surface without brake) right 476" *(12.09 m)* left 472" *(11.99 m)* **Power take-off** 996 rpm at 2400 engine rpm and 540 rpm at 2125 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

TRACTOR SOUND LEVEL WITH CAB	dB(A)	Front Wheel Drive Disengaged dB(A)
Maximum Available Power—Two Hours	86.5	86.5
75% of Pull at Maximum Power—Ten Hours	–	84.0
50% of Pull at Maximum Power—Two Hours	–	82.0
50% of Pull at Reduced Engine Speed—Two Hours	–	82.0
Bystander in 16th (4 H) gear	–	86.5

DRAWBAR PERFORMANCE
(Front Wheel Drive Engaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption			Temp. °F *(°C)*			Barom. inch Hg *(kPa)*
					gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Cool-ing med	Air wet bulb	Air dry bulb	
Maximum Available Power—Two Hours 12th (4 N) Gear											
76.32 *(56.91)*	5539 *(24.64)*	5.17 *(8.31)*	2400	5.04	5.310 *(20.101)*	0.491 *(0.299)*	14.37 *(2.831)*	194 *(90.0)*	59 *(15.0)*	70 *(20.8)*	29.115 *(98.317)*
MAXIMUM POWER IN SELECTED GEARS											
71.25 *(53.13)*	11264 *(50.11)*	2.37 *(3.82)*	2503	14.88	9th (1 N) Gear			191 *(88.3)*	58 *(14.4)*	61 *(16.1)*	29.080 *(98.199)*
79.86 *(59.55)*	7345 *(32.67)*	4.08 *(6.56)*	2399	6.35	11th (3 N) Gear			201 *(93.6)*	68 *(20.0)*	77 *(25.0)*	28.850 *(97.422)*
78.37 *(58.44)*	5659 *(25.17)*	5.19 *(8.36)*	2400	4.59	12th (4 N) Gear			201 *(93.9)*	65 *(18.3)*	73 *(22.8)*	28.860 *(97.456)*

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 18.4R34; 8; 20 *(140)*	Two 18.4R34; 8; 20 *(140)*
Ballast	—Liquid (each)	900 lb *(408 kg)*	None
	—Cast Iron (each)	300 lb *(136 kg)*	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 12.4R28; 8; 26 *(180)*	Two 12.4R28; 8; 26 *(180)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	698 lb *(317 kg)*	None
Height of Drawbar		22.5 in *(570 mm)*	22.5 in *(570 mm)*
Static Weight with Operator	—Rear	7820 lb *(3547 kg)*	5420 lb *(2458 kg)*
	—Front	4825 lb *(2189 kg)*	3430 lb *(1556 kg)*
	—Total	12645 lb *(5736 kg)*	8850 lb *(4014 kg)*

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump return was 145°F *(62.6°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1354**.

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

Hesston Fiat 980 DT Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

NEBRASKA TRACTOR TEST 1355 — STEIGER PTA-325 DIESEL 10 SPEED

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 6th (5 L) Gear											
263.70 *(196.64)*	14573 *(64.82)*	6.79 *(10.92)*	2099	3.46	18.497 *(70.018)*	0.495 *(0.301)*	14.26 *(2.808)*	196 *(90.8)*	70 *(21.1)*	88 *(31.4)*	28.835 *(97.371)*
75% of Pull at Maximum Power—Ten Hours 6th (5 L) Gear											
219.04 *(163.34)*	11315 *(50.33)*	7.26 *(11.68)*	2230	2.67	16.284 *(61.643)*	0.525 *(0.319)*	13.45 *(2.650)*	184 *(84.2)*	58 *(14.3)*	66 *(18.8)*	29.025 *(98.013)*
50% of Pull at Maximum Power—Two Hours 6th (5 L) Gear											
151.89 *(113.26)*	7536 *(33.52)*	7.56 *(12.16)*	2296	1.56	13.151 *(49.783)*	0.611 *(0.372)*	11.55 *(2.275)*	186 *(85.3)*	70 *(20.8)*	88 *(30.8)*	28.815 *(97.304)*
50% of Pull at Reduced Engine Speed—Two Hours 8th (3 H) Gear											
151.54 *(113.00)*	7555 *(33.61)*	7.52 *(12.10)*	1574	1.90	10.266 *(38.862)*	0.478 *(0.291)*	14.76 *(2.908)*	180 *(82.2)*	58 *(14.4)*	64 *(17.5)*	29.020 *(97.996)*

MAXIMUM POWER IN SELECTED GEARS

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Gear	Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
149.29 *(111.33)*	31876 *(141.79)*	1.76 *(2.83)*	2277	14.91	1st (1L) Gear	182 *(83.3)*	64 *(17.8)*	65 *(18.3)*	28.820 *(97.321)*
251.17 *(187.30)*	30581 *(136.03)*	3.08 *(4.96)*	2099	12.19	2nd (2L) Gear	187 *(86.1)*	65 *(18.3)*	66 *(18.9)*	28.820 *(97.321)*
259.42 *(193.45)*	23734 *(105.58)*	4.10 *(6.60)*	2100	6.43	3rd (1H) Gear	187 *(85.8)*	58 *(14.4)*	61 *(16.1)*	28.980 *(97.861)*
266.90 *(199.03)*	24144 *(107.40)*	4.15 *(6.67)*	2100	6.58	4th (3L) Gear	187 *(85.8)*	58 *(14.4)*	61 *(16.1)*	28.960 *(97.794)*
274.88 *(204.98)*	19305 *(85.87)*	5.34 *(8.59)*	2100	4.81	5th (4L) Gear	186 *(85.6)*	58 *(14.4)*	61 *(16.1)*	28.930 *(97.692)*
272.55 *(203.24)*	15089 *(67.12)*	6.77 *(10.90)*	2101	3.62	6th (5L) Gear	186 *(85.6)*	58 *(14.4)*	60 *(15.6)*	28.880 *(97.523)*
273.56 *(204.00)*	13081 *(58.19)*	7.84 *(12.62)*	2102	3.05	7th (2H) Gear	186 *(85.6)*	58 *(14.4)*	62 *(16.7)*	29.010 *(97.962)*
269.98 *(201.32)*	10141 *(45.11)*	9.98 *(16.07)*	2101	2.39	8th (3H) Gear	187 *(86.1)*	59 *(15.0)*	64 *(17.8)*	29.030 *(98.030)*

LUGGING ABILITY IN 6th (5 L) GEAR

Crankshaft Speed rpm	2101	1884	1680
Pull—lbs *(kN)*	15089 *(67.12)*	17210 *(76.55)*	18426 *(81.96)*
Increase in Pull %	0	14	22
Power—Hp *(kW)*	272.55 *(203.24)*	276.69 *(206.33)*	263.03 *(196.14)*
Speed—Mph *(km/h)*	6.77 *(10.90)*	6.03 *(9.70)*	5.35 *(8.61)*
Slip %	3.62	4.26	4.73

At 1500 RPM the automatic transmission shifted down to 5th (4L) gear and the test was terminated

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	75.5
75% of Pull at Maximum Power—Ten Hours	75.5
50% of Pull at Maximum Power—Two Hours	75.5
50% of Pull at Reduced Engine Speed—Two Hours	75.5
Bystander in 10th (5H) gear	100.0

Department of Agricultural Engineering

Dates of Test: June 16-23, 1980

Manufacturer: STEIGER TRACTOR, INC., 3101 First Ave. North, Fargo, North Dakota 58102

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE 30 API service classification** SB/SE-CA/CD **To motor** 7.554 gal *(28.592 l)* **Drained from motor** 6.193 gal *(23.441 l)* **Transmission lubricant** hydraulic transmission fluid type C-3 (Dextron) **Dropbox lubricant** 303 or equivalent **Hydraulic oil** SAE 10 hydraulic fluid, 303 or equivalent **Final drive lubricant** SAE 80W90 **Total time engine was operated** 35.5 hours.

ENGINE Make Caterpillar Dsl **Type** six cylinder vertical with turbocharger **Serial No.** 90U 11096 **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 5.4" × 6.5" *(137 mm × 165 mm)* **Compression ratio** 14.5 to 1 **Displacement** 893 cu in *(14634 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow paper cartridge **Oil cooler** engine coolant heat exchangers for crankcase and transmission oil, radiator for hydraulic oil **Fuel filter** one paper cartridge **Muffler** none **Cooling medium temperature control** one thermostat.

CHASSIS: Type four wheel drive with duals **Serial No.** 150-00076 **Tread width** rear 79" *(2007 mm)* to 136.4" *(3464 mm)* front 79.0" *(2007 mm)* to 136.4" *(3464 mm)* **Wheel base** 132.5" *(3366 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 77.4" *(1966 mm)* Vertical distance above roadway 45.5" *(1156 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with automatic power shift and torque converter lockup **Advertised speeds mph *(km/h)*** first 1.8 *(2.9)* second 3.4 *(5.4)* third 4.2 *(6.7)* fourth 4.2 *(6.8)* fifth 5.4 *(8.6)* sixth 6.7 *(10.8)* seventh 7.7 *(12.4)* eighth 9.8 *(15.7)* ninth 12.3 *(19.8)* tenth 15.4 *(24.9)* reverse 2.3 *(3.6)*, 5.2 *(8.4)* **Clutch** none **Brakes** multiple dry disc hydraulically operated by foot pedal or mechanically

TIRES, BALLAST AND WEIGHT		**With Ballast**	**Without Ballast**
Rear Tires	—No., size, ply & psi *(kPa)*	Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)*	Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)*	Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)*
Ballast	—Liquid (each inner)	1570 lb *(712 kg)*	None
	—Cast Iron (each)	None	None
Height of Drawbar		14.5 in *(370 mm)*	14.5 in *(370 mm)*
Static Weight with Operator	—Rear	12960 lb *(5879 kg)*	12960 lb *(5879 kg)*
	Front	21000 lb *(9525 kg)*	17860 lb *(8101 kg)*
	Total	33960 lb *(15404 kg)*	30820 lb *(13980 kg)*

by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 257" *(6.53 m)* left 261.5" *(6.64 m)* **Turning space diameter** (on concrete surface without brake) right 537" *(13.64 m)* left 546" *(13.87 m)* **Power take-off** none.

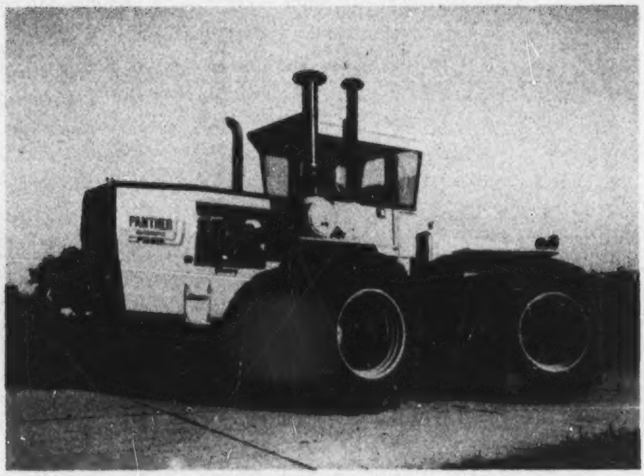
REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 163°F *(72.8°C)*. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. During preliminary drawbar tests an air conditioner line developed a leak and freon was lost.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1355.**

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers



Steiger PTA-325 Diesel

**The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director**

NEBRASKA TRACTOR TEST 1356 — VERSATILE 835 DIESEL 12 SPEED

POWER TAKE-OFF PERFORMANCE

Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1009 rpm)								
198.23 *(147.82)*	2100	13.103 *(49.601)*	0.467 *(0.284)*	15.13 *(2.980)*	182 *(83.5)*	65 *(18.1)*	75 *(23.8)*	28.923 *(97.670)*
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
174.33 *(130.00)*	2172	12.379 *(46.859)*	0.501 *(0.305)*	14.08 *(2.774)*	181 *(82.8)*	64 *(17.8)*	75 *(23.9)*	....
0.00 *(0.00)*	2280	5.038 *(19.072)*	....	....	177 *(80.6)*	63 *(17.2)*	75 *(23.9)*	....
89.25 *(66.56)*	2225	8.534 *(32.306)*	0.675 *(0.411)*	10.46 *(2.060)*	178 *(81.4)*	63 *(17.2)*	75 *(23.9)*	....
197.64 *(147.38)*	2100	13.093 *(49.561)*	0.468 *(0.285)*	15.10 *(2.974)*	182 *(83.6)*	63 *(17.2)*	75 *(23.9)*	....
44.98 *(33.54)*	2248	6.512 *(24.652)*	1.022 *(0.622)*	6.91 *(1.361)*	178 *(80.8)*	63 *(17.2)*	75 *(23.9)*	....
132.31 *(98.67)*	2200	10.641 *(40.282)*	0.568 *(0.345)*	12.43 *(2.449)*	179 *(81.7)*	63 *(17.2)*	75 *(23.9)*	....
Av 106.42 ***Av (79.36)***	**2204**	**9.366** ***(35.455)***	**0.622** ***(0.378)***	**11.36** ***(2.238)***	**179** ***(81.8)***	**63** ***(17.3)***	**75** ***(23.9)***	**28.993** ***(97.906)***

DRAWBAR PERFORMANCE AT 2100 RPM

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power—Two Hours 7th (2-3) Gear											
171.41 *(127.82)*	10488 *(46.65)*	6.13 *(9.86)*	2100	3.32	13.027 *(49.314)*	0.537 *(0.326)*	13.16 *(2.592)*	182 *(83.3)*	62 *(16.7)*	72 *(21.9)*	29.035 *(98.047)*
75% of Pull at Maximum Power—Ten Hours 7th (2-3) Gear											
138.81 *(103.51)*	8048 *(35.80)*	6.47 *(10.41)*	2193	2.27	11.696 *(44.276)*	0.595 *(0.362)*	11.87 *(2.338)*	183 *(83.6)*	77 *(25.0)*	86 *(29.9)*	28.852 *(97.429)*
50% of Pull at Maximum Power—Two Hours 7th (2-3) Gear											
95.15 *(70.95)*	5397 *(24.01)*	6.61 *(10.64)*	2223	1.51	9.806 *(37.120)*	0.728 *(0.443)*	9.70 *(1.911)*	181 *(82.5)*	74 *(23.3)*	88 *(30.8)*	28.785 *(97.203)*
50% of Pull at Reduced Engine Speed—Two Hours 11th (3-3) Gear											
95.13 *(70.94)*	5373 *(23.90)*	6.64 *(10.69)*	1146	1.43	6.531 *(24.724)*	0.485 *(0.295)*	14.57 *(2.869)*	183 *(83.9)*	75 *(23.9)*	90 *(31.9)*	28.775 *(97.169)*
MAXIMUM POWER IN SELECTED GEARS											
157.96 *(117.79)*	26380 *(117.34)*	2.25 *(3.61)*	2102	14.16		1st (1-1) Gear		179 *(81.7)*	63 *(17.2)*	66 *(18.9)*	28.930 *(97.692)*
161.98 *(120.79)*	22702 *(100.98)*	2.68 *(4.31)*	2100	11.86		2nd (1-2) Gear		183 *(83.9)*	75 *(23.9)*	83 *(28.3)*	28.850 *(97.422)*
167.84 *(125.16)*	19786 *(88.01)*	3.18 *(5.12)*	2099	8.88		3rd (1-3) Gear		185 *(84.7)*	72 *(22.2)*	82 *(27.8)*	28.770 *(97.152)*
171.87 *(128.16)*	17012 *(75.67)*	3.79 *(6.10)*	2099	6.63		4th (1-4) Gear		185 *(84.7)*	71 *(21.7)*	80 *(26.7)*	28.770 *(97.152)*
175.28 *(130.71)*	14617 *(65.02)*	4.50 *(7.24)*	2100	5.17		5th (2-1) Gear		184 *(84.4)*	70 *(21.1)*	79 *(26.1)*	28.770 *(97.152)*
175.86 *(131.14)*	12513 *(55.66)*	5.27 *(8.48)*	2099	4.20		6th (2-2) Gear		184 *(84.2)*	71 *(21.7)*	80 *(26.7)*	28.760 *(97.118)*
179.07 *(133.53)*	10949 *(48.70)*	6.13 *(9.87)*	2100	3.13		7th (2-3) Gear		185 *(85.0)*	77 *(25.0)*	85 *(29.4)*	28.860 *(97.456)*
176.52 *(131.63)*	9261 *(41.19)*	7.15 *(11.50)*	2099	2.89		8th (2-4) Gear		186 *(85.3)*	72 *(22.2)*	83 *(28.3)*	28.770 *(97.152)*
174.23 *(129.92)*	7250 *(32.25)*	9.01 *(14.50)*	2098	2.19		9th (3-1) Gear		187 *(85.8)*	73 *(22.8)*	84 *(28.9)*	28.770 *(97.152)*

Department of Agricultural Engineering

Dates of Test: June 13-July 3, 1980

Manufacturer: VERSATILE MANUFACTURING CO., 1260 Clarence Avenue, Winnipeg, Manitoba Canada R3T 1T3

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** ***(15°/15°)*** 0.8482 **Fuel weight** 7.062 lbs/gal *(0.846 kg/l)* **Oil SAE** 30 **API service classification** SB/SE-CA/CD **To motor** 7.913 gal *(29.952 l)* **Drained from motor** 6.208 gal *(23.497 l)* **Transmission and hydraulic lubricant** Esso Hydraul 56 or equivalent **Final drive lubricant** SAE 90 **Total time engine was operated** 70.5 hours

ENGINE Make Cummins Dsl **Type** six cylinder vertical with turbocharger **Serial No.** 10911188 **Crankshaft** lengthwise **Rated rpm** 2100 **Constant power range** 1750 to 2100 rpm **Bore and stroke** 5.5" × 6.0" *(139.7 mm × 152.4 mm)* **Compression ratio** 14.1 to 1 **Displacement** 855 cu in *(14013 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** vertical **Cooling medium temperature control** one thermostat.

CHASSIS: Type four wheel drive with duals **Serial No.** 835 80 034670 **Tread width** rear 72" *(1829 mm)* to 118" *(2997 mm)* front 72" *(1829 mm)* to 118" *(2997 mm)* **Wheel base** 130" *(3302 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 84.0" *(2134 mm)* Vertical distance above roadway 42.0" *(1067 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph** ***(km/h)*** first 2.6 *(4.2)* second 3.0 *(4.9)* third 3.5 *(5.6)* fourth 4.1 *(6.6)* fifth 4.7 *(7.6)* sixth 5.5 *(8.9)* seventh 6.3 *(10.2)* eighth 7.3 *(11.8)* ninth 9.2 *(14.8)* tenth 10.7 *(17.2)* eleventh 12.3 *(19.8)* twelfth 14.3 *(23.0)* reverse 3.4 *(5.4)*, 3.9 *(6.3)*, 4.5 *(7.3)*, 5.2 *(8.4)* **Clutch** dual dry disc operated by foot pedal **Brakes** dual caliper disc hydraulically operated by foot pedal or mechanically by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 239" *(6.07 m)* left 239" *(6.07 m)* **Turning space diameter** (on concrete surface without brake) right 490" *(12.45 m)* left 490" *(12.45 m)* **Power take-off** 1009 rpm at 2100 engine rpm.

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

LUGGING ABILITY IN 7th (2-3) GEAR

Crankshaft Speed rpm	2100	1888	1682	1466	1257	1045
Pull—lbs *(kN)*	10949 *(48.70)*	13232 *(58.86)*	15237 *(67.78)*	16590 *(73.80)*	16531 *(73.53)*	15642 *(69.58)*
Increase in Pull %	0	21	39	52	51	43
Power—Hp *(kW)*	179.07 *(133.53)*	192.30 *(143.40)*	195.44 *(145.74)*	184.26 *(137.40)*	157.36 *(117.34)*	124.29 *(92.68)*
Speed—Mph *(km/h)*	6.13 *(9.87)*	5.45 *(8.77)*	4.81 *(7.74)*	4.17 *(6.70)*	3.57 *(5.74)*	2.98 *(4.80)*
Slip %	3.13	4.50	5.25	5.83	5.98	5.54

TRACTOR SOUND LEVEL WITH CAB	2100 RPM dB(A)	1900 RPM dB(A)	1750 RPM dB(A)
Maximum Available Power—Two Hours	81.5	80.5	81.0
75% of Pull at Maximum Power—Ten Hours	83.0	–	–
50% of Pull at Maximum Power—Two Hours	83.0	–	–
50% of Pull at Reduced Engine Speed—Two Hours	78.0	–	–
Bystander in 12th (3-4) gear	89.0	–	–

DRAWBAR PERFORMANCE AT 1900 RPM

Maximum Available Power—Two Hours 7th (2-3) Gear

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
186.11 *(138.78)*	12714 *(56.55)*	5.49 *(8.83)*	1898	4.27	13.063 *(49.448)*	0.496 *(0.302)*	14.25 *(2.807)*	186 *(85.5)*	64 *(17.5)*	75 *(23.6)*	29.015 *(97.979)*

MAXIMUM POWER IN SELECTED GEAR

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
191.15 *(142.54)*	13083 *(58.20)*	5.48 *(8.82)*	1899	4.50	7th (2-3) Gear			184 *(84.2)*	69 *(20.6)*	76 *(24.4)*	28.750 *(97.084)*

DRAWBAR PERFORMANCE AT 1750 RPM

Maximum Available Power—Two Hours 7th (2-3) Gear

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
191.23 *(142.60)*	14299 *(63.60)*	5.02 *(8.07)*	1749	5.13	12.939 *(48.979)*	0.478 *(0.291)*	14.78 *(2.911)*	185 *(85.0)*	71 *(21.4)*	78 *(25.6)*	28.915 *(97.642)*

MAXIMUM POWER IN SELECTED GEARS

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cooling med	Temp. °F *(°C)* Air wet bulb	Temp. °F *(°C)* Air dry bulb	Barom. inch Hg *(kPa)*
174.69 *(130.27)*	25638 *(114.04)*	2.56 *(4.11)*	1807	14.95	3rd (1-3) Gear			181 *(82.5)*	63 *(17.2)*	66 *(18.9)*	28.930 *(97.692)*
187.20 *(139.59)*	22957 *(102.12)*	3.06 *(4.92)*	1749	9.56	4th (1-4) Gear			181 *(82.8)*	63 *(17.2)*	66 *(18.9)*	28.930 *(97.692)*
189.84 *(141.56)*	19619 *(87.27)*	3.63 *(5.84)*	1750	8.05	5th (2-1) Gear			189 *(86.9)*	70 *(21.1)*	79 *(26.1)*	28.770 *(97.152)*
194.32 *(144.90)*	16958 *(75.43)*	4.30 *(6.92)*	1749	6.42	6th (2-2) Gear			188 *(86.4)*	71 *(21.7)*	80 *(26.7)*	28.760 *(97.118)*
(195.90) *(146.08)*	14669 *(65.25)*	5.01 *(8.06)*	1749	5.17	7th (2-3) Gear			186 *(85.3)*	70 *(21.1)*	78 *(25.6)*	28.750 *(97.084)*
198.10 *(147.72)*	12647 *(56.26)*	5.87 *(9.45)*	1750	4.35	8th (2-4) Gear			188 *(86.4)*	72 *(22.2)*	83 *(28.3)*	28.770 *(97.152)*
198.32 *(147.89)*	10013 *(44.54)*	7.43 *(11.95)*	1746	3.13	9th (3-1) Gear			189 *(86.9)*	73 *(22.8)*	84 *(28.9)*	28.770 *(97.152)*
197.02 *(146.91)*	8499 *(37.80)*	8.69 *(13.99)*	1749	2.58	10th (3-2) Gear			188 *(86.4)*	73 *(22.8)*	85 *(29.4)*	28.770 *(97.152)*

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Four 18.4-38; 8; inner 16 *(110)* outer 14 *(95)*	Four 18.4-38; 8; inner 16 *(110)* outer 14 *(95)*
Ballast	—Liquid (each inner)	655 lb *(297 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Four 18.4-38; 8; inner 16 *(110)* outer 14 *(95)*	Four 18.4-38; 8; inner 16 *(110)* outer 14 *(95)*
Ballast	—Liquid (each inner)	1205 lb *(547 kg)*	None
	—Cast Iron (each)	None	None
Height of Drawbar		17.5 in *(445 mm)*	17.5 in *(445 mm)*
Static Weight with Operator	—Rear	10930 lb *(4958 kg)*	9620 lb *(4364 kg)*
	Front	17070 lb *(7743 kg)*	14660 lb *(6649 kg)*
	Total	28000 lb *(12701 kg)*	24280 lb *(11013 kg)*

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump return was 147°F *(63.8°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1356.**

LOUIS I. LEVITICUS
Engineer-in Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

Versatile 835 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

world farming

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Nebraska Tractor Tests Summarized (Tests from 1971 through 1980)

						ENGINE									—FUEL CONSUMPTION (HP Hours Per Gallon) @:—				
																PTO	—Varying Drawbar Power—		
MAKE AND MODEL OF TRACTOR	Test No.	Fuel Used	Weight With Ballast	Lbs. Ballast Carried	No. of Cylinders	Bore and Stroke	Displacement Cu. in.	Rated RPM Dwbr.	Max. PTO HP @ Rated Engine RPM	Std. PTO RPM	Max. PTO HP @ Std. PTO RPM	Max. Drawbar HP	MPH @ Max. Dwbr. HP	Max. Lbs. Pull	Max. PTO HP @ Std. PTO RPM	Average @ Varying Power	Max. Available Power	75% of Pull Max. Power	50% of Pull @ Max. Power
Allis-Chalmers																			
175	1156	Gas.	8400	2010	4	4.000x4.500	226	1800	60.88	540	56.02	53.17	5.50	6875	11.78	9.44	10.22	9.64	8.20
Two-Ten	1065	Die.	18045	5620	6	4.250x5.000	426	2200	122.74	1000	122.40	106.35	4.45	14023	15.21	11.79	13.14	11.85	9.70
5020	1270	Die.	3358	1298	2	3.62x3.74	77	2500	21.79	540	20.78	18.05	5.74	2346	13.99	11.77	11.07	10.51	8.62
5030	1271	Die.	3876	1346	2	3.82x3.94	90.1	2500	26.42	540	25.61	23.92	4.26	3389	13.82	11.28	11.64	11.48	9.68
5040	1230	Die.	6240	2180	3	3.740x4.330	143	2400	40.05	540	36.69	35.86	5.00	4837	15.47	11.80	12.58	12.74	10.44
5050 Diesel	1240	Die.	7960	3550	3	4.055x4.330	168	2700	51.46	540	47.16	45.22	5.68	6075	16.10	12.42	12.58	13.01	11.24
7000PS Diesel	1195	Die.	12580	3030	6	3.875x4.250	301	2200	106.44	1000	105.85	92.64	6.08	9907	15.70	12.21	13.21	12.27	10.16
7010PD Die. 20 Speed	1345	Die.	12790	1530	6	3.875x4.25	301	2300	106.53	1000	107.52	91.44	6.05	9426	15.48	11.57	12.59	11.48	9.68
7010PS Die. 12 Speed	1346	Die.	12740	1360	6	3.875x4.25	301	2300	106.72	1000	106.33	91.61	6.11	9516	15.43	11.74	12.43	11.35	9.58
7020 Power Shift	1259	Die.	15610	3840	6	3.875x4.250	301	2300	123.79	1000	123.50	105.36	6.59	12001	16.01	12.45	13.10	12.25	10.34
7020 Power Director	1260	Die.	15655	4085	6	3.875x4.250	301	2300	123.85	1000	125.51	107.36	6.63	11964	16.08	12.12	13.09	12.08	10.13
7030 Diesel	1119	Die.	16560	4130	6	4.250x5.000	426	2300	130.98	1000	131.14	113.28	4.94	12610	15.45	11.76	12.92	11.90	9.91
7040 Diesel	1166	Die.	17380	5585	6	4.250x5.000	426	2300	136.49	1000	136.26	116.21	6.58	13619	15.35	11.78	12.94	11.86	9.80
7040PS Diesel	1196	Die.	17355	4977	6	4.250x5.000	426	2300	136.30	1000	136.15	117.75	4.61	13547	15.51	11.95	13.05	12.29	10.39
7045 Power Director	1261	Die.	18980	4645	6	4.250x5.000	426	2300	146.18	1000	146.46	127.84	7.04	15430	14.62	11.26	12.16	11.40	9.72
7045 Powershift Diesel	1308	Die.	18990	4390	6	4.25x5.00	426	2300	146.88	1000	146.67	127.17	4.92	15449	14.92	11.32	12.58	11.71	9.62
7050 Diesel	1120	Die.	19530	5005	6	4.250x5.000	426	2300	156.49	1000	156.63	135.11	5.47	16206	16.04	12.69	13.47	12.67	10.53
7060 Diesel	1167	Die.	20490	6500	6	4.250x5.000	426	2300	161.51	1000	160.44	140.59	6.94	17370	15.99	12.71	13.63	12.75	10.55
7060PS Diesel	1197	Die.	20560	5915	6	4.250x5.000	426	2300	161.42	1000	161.65	144.13	4192	17851	16.08	12.76	13.80	12.98	10.79
7080 Diesel	1168	Die.	21720	7115	6	4.250x5.000	426	2550	181.51	1000	181.51	153.78	4.58	18478	15.71	12.24	13.23	12.11	10.02
7580 4WD	1229	Die.	25000	1490	6	4.250x5.000	426	2550	186.35	1000	186.35	160.79	6.91	23310	14.81	11.47	12.22	11.39	9.40
8550 Diesel	1262	Die.	29360	2320	6	5.250x5.625	731	2500	253.88	1000	253.88	223.39	7.24	26220	14.57	10.94	12.47	11.45	9.35
Belarus																			
MTZ 80 Diesel	1139	Die.	11575	3735	4	4.331x4.921	288.7	2200	74.79	1000	73.88	65.64	5.08	8141	15.30	13.07	13.12	13.12	11.32
250 Diesel	1183	Die.	5490	939	2	4.134x4.724	127	1800	24.95	540	25.02	21.81	4.54	2280	15.56	13.23	13.19	13.20	11.80
T25A Diesel	1200	Die.	5490	939	2	4.134x4.724	127	1800	28.70	540	28.15	24.46	4.51	2570	13.95	13.46	12.21	13.48	11.94
1500 Diesel 12 Speed	1333	Die.	19885	1120	6	5.118x4.528	558	2100	168.76	1000	169.63	151.96	5.31	19311	16.48	13.69	14.53	13.98	12.25
7100 Diesel 16 Speed	1334	Die.	32460	None	12	5.118x5.512	1360	1900	269.62	1000	269.62	259.46	4.78	30845	15.85	13.26	14.82	14.35	12.56
David Brown																			
885 Gasoline	1143	Gas.	6550	2530	3	3.939x4.000	146.1	2200	39.26	1000†	37.26	32.92	4.61	5308	10.96	8.19	7.55	7.00	7.21
885 Diesel	1137	Die.	6480	2125	3	3.939x4.500	164.4	2200	43.20	1000†	40.87	37.16	4.57	5135	16.61	14.03	13.85	13.73	12.67
990 Diesel	1144	Die.	9350	4690	4	3.939x4.000	194.9	2200	53.77	1000†	50.48	46.34	5.54	7335	15.53	13.23	13.37	12.91	11.14
995 Diesel	1136	Die.	9475	4325	4	3.939x4.500	219	2200	58.77	1000†	55.33	50.42	5.44	7317	16.60	13.94	13.78	13.60	12.40
1210 Diesel	1142	Die.	10440	4640	4	3.939x4.500	219	2300	65.98	1000†	59.50	57.23	6.16	8097	16.40	14.43	13.61	14.36	12.93
1212 Diesel	1138	Die.	10435	4030	4	3.939x4.500	219	2300	65.38	1000†	58.25	54.10	6.92	8137	15.35	13.84	12.56	13.27	11.82
Case																			
770 Manual	1088	Die.	12300	2230	4	4.125x5.000	267	2000	63.90	540	62.85	57.12	5.07	8853	15.16	12.43	13.20	12.67	10.64
770 Power Shift	1089	Die.	12375	2215	4	4.125x5.000	267	2000	64.56	540	61.93	57.57	4.28	8927	14.72	12.22	12.62	12.45	10.53
870 Manual	1077	Die.	13520	3450	4	4.625x5.000	336	2000	78.08	1000	76.63	70.19	5.03	9733	15.46	13.01	13.35	13.44	11.89
870 Power Shift	1076	Die.	13550	3320	4	4.625x5.000	336	2000	77.92	1000	77.11	67.47	4.23	10075	14.42	12.15	12.13	12.41	11.10
870 Manual Diesel	1149	Die.	13510	3435	4	4.625x5.000	336	2100	80.20	1000	77.93	71.09	5.23	10047	14.52	12.13	12.42	12.53	10.88
870 Power Shift	1150	Die.	13760	3664	4	4.625x5.000	336	2100	80.49	1000	76.52	71.04	4.39	10030	13.64	11.60	11.49	12.04	10.88
970 Manual	1078	Die.	14470	3390	6	4.125x5.000	401	2000	93.87	1000	92.11	81.27	4.91	10644	15.51	12.75	13.53	13.26	11.50
970 Power Shift	1068	Die.	14510	3320	6	4.125x5.000	401	2000	93.41	1000	93.47	81.90	6.13	11009	15.11	12.31	12.88	12.37	12.12
1070 Manual	1067	Die.	17520	6110	6	4.375x5.000	451	2100	107.36	1000	103.91	93.70	4.50	13161	15.75	12.42	13.05	12.62	11.34
1070 Power Shift	1066	Die.	17675	6165	6	4.375x5.000	451	2100	108.10	1000	99.92	95.37	4.44	13780	15.44	12.43	12.62	12.68	11.04
1270	1103	Die.	17625	4185	6	4.375x5.000	451	2100	126.70	1000	126.60	109.77	6.79	12690	14.52	11.05	12.13	11.55	9.81
1270	1160	Die.	18910	3440	6	4.375x5.000	451	2100	135.39	1000	135.41	121.83	6.46	15648	14.23	11.14	12.16	11.49	9.88
1370	1102	Die.	20960	5670	6	4.625x5.000	504	2100	142.51	1000	143.64	123.01	4.78	16609	15.37	1145	12.73	11.82	10.16
1370 Diesel	1148	Die.	20290	4945	6	4.625x5.000	504	2200	155.56	1000	156.32	134.25	5.00	16480	15.01	10.95	12.04	10.91	9.109

1410 Manual	1209	Die.	10910	3160	4	3.939x4.500	219	2300	80.88	540	79.35	69.25	5.32	7846	17.47	14.69	14.20	14.38	12.45
1410 Power Shift	1210	Die.	10990	3150	4	3.939x4.500	219	2300	80.61	540	76.21	67.98	7.90	7816	16.86	13.76	13.34	13.21	11.45
1570	1218	Die.	20350	4060	6	4.625x5.000	504	2100	180.41	1000	180.41	152.96	5.02	17115	15.09	12.47	12.72	12.46	10.88
2090 Manual Diesel	1304	Die.	15030	3120	6	4.625x5.000	504	2100	108.74	1000	108.74	94.99	4.60	11655	15.40	12.23	13.41	12.69	10.73
2090 Power Shift	1295	Die.	15190	3160	6	4.625x5.00	504	2100	108.29	1000	108.29	93.60	4.81	11211	14.94	11.77	12.49	11.96	10.14
2290 Manual Diesel	1296	Die.	15400	2630	6	4.625x5.000	504	2100	128.80	1000	128.80	109.36	5.32	12635	14.52	11.66	12.46	11.73	10.07
2290 Powershift Diesel	1297	Die.	15840	2140	6	4.625x5.000	504	2100	129.08	1000	129.08	111.68	6.25	12749	13.76	11.53	12.65	11.37	9.77
2390 Powershift Diesel	1302	Die.	18710	3120	6	4.625x5.000	504	2100	160.72	1000	160.72	146.01	6.59	16020	15.23	12.41	13.20	12.66	10.99
2470	1114	Die.	20485	None	6	4.625x5.000	504	2200	174.20	1000	174.20	154.24	5.67	18050	15.22	12.33	13.30	12.55	10.86
2590 Powershift Diesel	1303	Die.	20500	4760	6	4.625x5.000	504	2100	180.38	1000	180.38	159.01	6.57	17865	15.53	12.97	13.42	13.03	11.67
2670 Diesel	1165	Die.	25260	4450	6	4.625x5.000	504	2200	219.44	1000	219.44	194.60	5.28	23618	15.29	12.59	13.42	12.60	10.88
2870 Diesel	1241	Die.	28150	3050	6	5.000x5.710	673	2200	252.10	1000	252.10	219.61	5.72	26386	15.45	12.01	12.98	12.37	10.40
M-B 4/94	1211	Die.	13110	4620	6	3.819x5.039	346	2550	73.33	1000†	70.17	66.33	5.33	10558	15.13	10.68	12.55	11.65	9.49
4490 Diesel	1328	Die.	22450	1610	6	4.625x5.000	504	2200	175.20	1000	175.20	152.80	7.14	21400	15.27	12.36	13.30	12.52	10.87
4690 Diesel	1329	Die.	25230	2920	6	4.625x5.000	504	2200	219.62	1000	219.62	195.60	5.97	24564	15.26	12.76	13.39	12.84	11.21
4890 Diesel	1330	Die.	28460	2710	6	5.00x5.71	673	2200	253.41	1000	253.41	224.81	5.96	27627	16.32	13.02	14.19	13.27	11.36
John Deere																			
830 Diesel	1146	Die.	5714	1338	3	3.860x4.330	152	2400	35.30	540	32.62	28.46	5.19	4252	14.74	11.37	11.84	11.03	9.09
850	1280	Die.	3528	992	3	3.15x3.35	78	2600	22.27	540	20.66	18.92	4.90	2699	14.26	11.51	11.23	11.22	10.21
950	1281	Die.	3615	803	3	3.54x3.54	105	2400	27.36	540	28.05	23.46	4.98	3056	14.68	12.36	12.42	12.23	10.63
1050 Diesel	1327	Die.	4140	730	3	3.54x3.54	105	2400	33.41	540	33.42	28.15	5.27	3466	15.46	12.36	12.34	11.99	10.13
1530 Diesel	1147	Die.	6863	1909	3	4.020x4.330	164	2500	45.38	540	41.36	38.86	5.58	5139	14.28	11.20	12.04	11.47	9.78
2030	1085	Die.	7430	2060	4	4.020x4.330	219	2500	60.65	540	55.23	52.33	5.92	6472	16.26	12.16	12.73	11.82	10.53
2030	1084	Gas.	7430	2200	4	4.020x4.330	219	2500	60.34	540	55.38	51.33	5.93	6340	11.59	7.69	8.65	7.66	5.88
2040 Diesel	1191	Die.	6420	1620	3	4.020x4.330	164	2500	40.86	540	37.62	34.15	5.64	4634	15.50	11.18	11.87	11.15	9.51
2040 Diesel 8 Speed	1350	Die.	6500	1465	3	4.19x4.33	179	2500	41.25	540	40.53	33.31	5.63	4873	15.62	11.73	12.02	11.35	9.03
2240 Diesel	1192	Die.	7340	2390	3	4.190x4.330	179	2500	50.37	540	46.78	41.28	5.54	5433	15.20	11.08	11.57	11.18	9.51
2630	1157	Die.	8430	2630	4	4.190x5.000	276	2500	70.37	540	69.02	58.15	5.38	6470	16.01	10.89	12.10	10.98	8.95
2840 Diesel	1249	Die.	10500	1695	6	4.020x4.330	329	2500	80.65	1000	76.27	67.47	6.21	8386	16.02	11.52	12.36	11.57	9.59
2940 Diesel 16 Speed	1351	Die.	10650	1215	6	4.19x4.33	359	2500	81.17	1000	81.46	67.98	4.64	7601	15.51	11.73	12.81	11.91	9.91
4030 Quad-Range	1111	Die.	10150	970	6	4.000x4.330	329	2500	80.33	1000	77.72	68.76	6.10	7512	15.40	10.69	11.71	10.99	8.92
4040 Diesel	1267	Die.	12055	1165	6	4.250x4.750	404	2200	90.80	1000	90.80	76.81	7.02	8936	13.49	10.59	11.24	10.96	9.21
4240 Diesel	1266	Die.	14090	1695	6	4.5625x4.75	466	2200	110.94	1000	110.94	95.18	5.42	11492	14.33	11.09	12.05	11.35	9.52
4230 Quad-Range	1112	Die.	14150	3250	6	4.250x4.750	404	2200	100.32	1000	100.32	86.36	6.65	11116	14.10	11.61	12.02	11.92	10.10
4430 Quad-Range	1110	Die.	15060	3710	6	4.250x4.750	404	2200	125.88	1000	125.88	108.46	6.58	12032	15.56	12.13	12.94	11.96	10.17
4440 Diesel	1265	Die.	15540	2270	6	4.5625x4.75	466	2200	130.58	1000	130.58	112.56	5.02	13392	15.21	11.73	12.69	11.83	9.90
4620 Power Shift	1064	Die.	18585	3655	6	4.250x4.750	404	2200	135.62	1000	130.79	115.58	4.73	14471	15.70	11.35	12.23	11.27	9.16
4620 Syncro-Range	1073	Die.	18640	3840	6	4.250x4.750	404	2200	135.76	1000	130.27	117.38	5.08	13916	15.57	11.51	12.66	11.86	9.91
4630 Power Shift	1113	Die.	16250	None	6	4.250x4.750	404	2200	150.66	1000	150.66	134.56	10.26	14478	15.68	12.43	13.34	12.88	10.59
4640 Diesel	1264	Die.	18120	None	6	4.5625x4.75	466	2200	156.30	1000	156.30	137.40	6.45	15362	15.61	12.29	13.30	12.15	10.32
4840 Diesel	1263	Die.	20370	2240	6	4.5625x4.75	466	2200	180.63	1000	181.63	157.09	4.76	17307	15.85	12.47	13.35	12.54	10.76
6030	1100	Die.	18180	None	6	4.750x5.000	531	2100	175.99	1000	175.99	155.42	6.65	15303	15.82	12.70	13.52	12.72	11.04
7020	1063	Die.	19570	1075	6	4.250x4.750	404	2200	146.17	1000	146.17	131.50	5.34	18726	14.28	11.41	12.82	11.81	9.51
7520	1101	Die.	22320	None	6	4.750x5.000	531	2100	175.82	1000	175.82	165.21	5.69	22517	15.18	12.37	13.76	12.82	10.97
8430 Diesel	1179	Die.	23100	290	6	4.563x4.750	466	2100	178.16	993	178.16	160.39	5.56	22503	15.12	11.98	13.44	12.64	10.42
8630 Diesel	1180	Die.	26480	1950	6	5.125x5.000	619	2100	225.59	993	225.59	202.31	4.58	26443	15.34	12.27	13.67	12.80	10.78
8440 Diesel	1323	Die.	26590	None	6	4.563x4.75	466	2100	179.83	1000	179.83	163.26	4.97	25383	15.86	12.55	14.29	13.06	11.25
8640 Diesel	1324	Die.	28270	None	6	5.125x5.00	619	2100	228.75	1000	228.75	208.38	4.63	27782	15.61	12.40	14.06	13.14	11.16
Deutz																			
4006	1075	Die.	7005	2520	3	3.940x4.720	172.5	2150	36.95	540	32.15	32.30	5.00	5043	17.76	13.93	14.84	14.00	12.78
D4506	1131	Die.	7390	2880	3	3.940x4.720	172.5	2300	43.15	540	42.17	37.07	4.68	5472	18.02	14.12	14.49	14.05	12.46
5506	1104	Die.	9780	4490	4	3.940x4.720	230	2300	56.08	540	52.88	48.81	6.33	6996	17.77	13.84	14.37	13.69	12.06
6006	1091	Die.	11250	4920	4	3.940x4.720	230	2300	65.30	1000	63.93	58.15	7.02	8623	15.26	13.53	13.02	13.64	11.75
D6206	1219	Die.	8780	3410	4	3.937x4.724	230	2050	60.23	540	57.00	52.41	6.04	6944	17.58	15.43	15.10	15.34	14.05
D6806	1220	Die.	11000	4605	4	3.937x4.724	230	2300	68.18	540	62.52	61.87	7.15	9095	16.39	14.73	14.63	15.05	13.52
8006	1074	Die.	11060	4210	6	3.940x4.720	345	2100	85.51	1000	81.18	74.46	6.73	8898	16.87	14.57	13.91	14.17	12.76
10006	1105	Die.	14440	6060	6	3.940x4.720	345	2400	105.04	1000	101.19	90.92	5.80	9979	14.39	13.46	12.14	13.52	11.70
13006	1092	Die.	15980	6375	6	3.940x4.720	345	2400	125.71	1000	133.27	114.85	8.47	10677	17.39	14.10	14.36	13.87	12.07
D13006	1130	Die.	16125	4075	6	3.940x4.720	345	2400	125.77	1000	126.19	110.24	5.74	13509	17.71	14.00	14.97	13.83	11.95
DX-90 Diesel	1305	Die.	13150	3210	5	3.94x4.72	287	2300	84.47	1000	80.82	74.19	6.53	8766	16.45	14.15	13.81	14.07	12.39
DX-110 Diesel	1306	Die.	14940	2360	6	3.94x4.72	345	2300	100.29	1000	93.61	90.82	7.00	11773	15.10	13.71	13.52	14.03	12.60
DX-160 Diesel	1307	Die.	18710	3870	6	4.02x4.92	374	2200	145.41	1000	140.99	124.24	5.63	15172	17.82	14.47	14.56	13.95	11.93

Nebraska Tractor Tests Summarized (Tests from 1971 through 1980)

						ENGINE									—FUEL CONSUMPTION (HP Hours Per Gallon) @:—				
																	—Varying Drawbar Power—		
MAKE AND MODEL OF TRACTOR	Test No.	Fuel Used	Weight With Ballast	Lbs. Ballast Carried	No. of Cylinders	Bore and Stroke	Displacement Cu. in.	Rated RPM Dwbr.	Max. PTO HP @ Rated Engine RPM	Std. PTO RPM	Max. PTO HP @ Std. PTO RPM	Max. Drawbar HP	MPH @ Max. Dwbr. HP	Max. Lbs. Pull	Max. PTO HP @ Std. PTO RPM	PTO Average @ Varying Power	Max. Available Power	75% of Pull Max. Power	50% of Pull @ Max. Power
Fiat																			
420	1293	Die.	6035	2115	3	3.74x4.33	143	2200	41.34	540	37.45	37.71	5.65	5299	14.81	12.93	13.30	13.92	12.35
580	1292	Die.	9210	2580	3	4.055x4.33	168	2700	51.61	540	48.42	44.20	3.38	8899	14.93	12.59	12.14	12.70	10.50
780	1294	Die.	10230	2830	4	4.055x4.33	224	2500	70.36	540	66.30	64.43	4.06	7776	15.41	13.62	13.93	14.17	12.50
Ford																			
1600 Diesel	1228	Die.	3840	1150	2	3.543x3.937	77.6	2500	23.02	540	19.78	18.53	5.76	2634	14.14	11.82	11.26	11.45	9.72
1700 Diesel	1325	Die.	3725	1110	2	3.54x3.94	77.6	2500	23.26	540	23.02	20.21	5.54	2801	13.02	11.21	10.89	11.48	10.41
1900 Diesel	1326	Die.	4160	1225	3	3.35x3.31	87.2	2800	26.88	540	25.68	23.49	6.20	2964	12.58	10.38	10.41	10.89	9.32
2600 6-Speed	1204	Die.	5990	1550	3	4.200x3.800	158	2000	32.38	540	30.51	27.93	5.57	4591	14.88	11.51	12.27	11.74	10.22
2600 6-Speed	1206	Gas.	6000	1645	3	4.200x3.800	158	2000	32.78	540	31.03	28.25	5.57	4198	11.14	7.89	8.83	8.17	6.73
2600 8-Speed	1222	Die.	6000	460	3	4.200x3.800	158	2000	32.47	540	30.76	28.18	5.56	4452	14.62	11.18	11.94	11.22	9.18
2600 8-Speed	1207	Gas.	6000	1710	3	4.200x3.800	158	2000	34.18	540	32.07	30.20	5.49	4455	11.54	8.38	9.45	8.64	7.15
3600 6-Speed	1203	Die.	6860	2445	3	4.200x4.200	175	2000	40.49	540	37.64	34.47	5.96	5114	15.32	12.12	12.84	12.34	9.97
3600 6-Speed	1208	Gas.	6900	2665	3	4.200x4.200	175	2000	40.17	540	37.91	35.53	5.91	5158	11.23	8.07	9.29	8.77	7.05
3600 8-Speed	1221	Die.	6890	1300	3	4.200x4.200	175	2000	40.55	540	38.31	34.10	5.96	5277	15.33	12.40	12.93	12.51	10.36
3600 8-Speed	1226	Gas.	6900	1500	3	4.200x4.200	175	2000	40.62	540	38.29	35.90	5.93	5123	11.42	8.16	9.02	8.57	6.88
4100 8-Speed	1202	Die.	7500	2590	3	4.200x4.400	183	2000	45.46	540	41.13	41.14	4.63	5557	15.59	11.57	12.47	11.96	10.36
4600 8-Speed	1223	Die.	8220	2340	3	4.400x4.400	201	2200	52.44	540	46.31	45.57	5.24	6342	14.59	11.49	11.82	11.85	10.77
5600 8-Speed	1201	Die.	9690	3785	4	4.200x4.200	233	2100	60.46	540	56.85	52.22	5.49	7105	15.77	12.83	12.87	12.88	11.02
5600 16-Speed	1227	Die.	9690	2380	4	4.200x4.200	233	2100	58.46	540	56.00	49.79	5.36	7140	15.06	11.94	12.07	11.94	10.42
6600 8-Speed	1217	Die.	9660	3780	4	4.400x4.200	256	2100	70.56	1000	70.07	61.36	6.91	7131	15.43	12.86	12.28	12.71	11.35
6600 16-Speed	1224	Die.	9700	2680	4	4.400x4.200	256	2100	68.10	1000	68.05	58.74	5.22	7267	14.97	12.64	12.05	12.77	11.05
6700 16-Speed	1244	Die.	9690	1180	4	4.400x4.200	255	2100	68.94	1000	68.62	58.06	7.55	6787	13.77	12.23	11.24	12.38	11.16
7000	1093	Die.	10795	4580	4	4.400x4.200	256	2100	83.49	540	78.81	71.42	5.71	8138	16.64	13.53	13.21	12.86	11.51
7600 16-Speed	1225	Die.	10760	3320	4	4.400x4.200	256	2100	84.79	1000	85.16	67.95	5.61	7779	15.95	12.35	12.44	11.77	9.92
7700 16-Speed	1242	Die.	10800	2400	4	4.400x4.200	255	2100	84.38	1000	84.29	71.57	7.28	7688	15.24	11.65	11.92	11.21	9.71
8700 16-Speed	1245	Die.	14760	2490	6	4.400x4.400	401	2300	110.58	1000	99.56	100.12	6.94	11581	15.02	11.91	12.37	12.28	10.93
8600 Dual Power	1121	Die.	14790	3360	6	4.400x4.400	401	2300	110.69	1000	99.32	93.62	4.88	11363	15.69	12.84	12.71	12.74	11.19
9600 Dual Power	1122	Die.	18000	6140	6	4.400x4.400	401	2200	135.46	1000	128.46	116.40	6.65	12203	16.88	12.99	13.31	12.64	11.06
9700 16-Speed	1243	Die.	17480	4620	6	4.40x4.400	401	2200	135.64	1000	129.25	118.08	6.55	15010	15.95	11.77	12.63	11.97	10.34
TW-10 Diesel	1301	Die.	15190	2325	6	4.4x4.4	401	2300	110.24	1000	101.09	97.24	8.25	12006	14.86	11.50	12.17	11.91	10.20
TW-20 Diesel	1300	Die.	17180	3495	6	4.4x4.4	401	2200	135.60	1000	131.43	121.47	7.85	14155	16.22	11.78	13.08	12.04	10.09
TW-30 Diesel	1299	Die.	19830	5205	6	4.4x4.4	401	2200	163.28	1000	157.04	144.17	8.32	16553	16.76	12.49	13.67	12.58	10.79
FW-20	1291	Die.	31000	1385	8	4.625x4.125	555	2850	....	....	....	156.85	5.45	27155	....	....	12.12	11.69	10.15
FW30	1288	Die.	31720	410	8	5.500x4.750	903	2600	(1)	....	....	212.02	6.64	27803	....	....	13.71	12.24	10.08
FW 30 without PTO												220.38	5.85	28302	....	....	14.16	12.73	10.96
FW 40	1290	Die.	32950	2320	8	5.500x4.750	903	2600	....	....	....	238.78	6.60	28245	....	....	13.83	12.84	10.73
FW 60	1289	Die.	33970	2870	8	5.500x4.750	903	2600	....	....	....	285.57	7.45	29304	....	....	14.90	13.38	11.27

(1) Equipped with controlled, hydrostatic pto with 105 output horsepower at 1000 rpm.

Hesston Fiat																			
680DT & 680 8 Speed	1352	Die.	10000	2660	4	3.397x4.331	211	2500	62.47	1000	61.20	53.65	5.44	6252	17.19	14.19	14.80	14.20	12.45
880DT-5 & 880-5 12 Speed	1353	Die.	11560	2810	5	4.055x4.331	280	2500	81.32	1000	80.95	70.73	7.63	7554	16.27	13.23	13.50	13.44	11.65
980DT & 980 16 Speed	1354	Die.	12645	3795	6	3.397x4.33	316	2400	91.12	996	91.17	77.42	5.00	8351	16.90	13.92	12.45	13.59	12.25
International Harvester																			
Int'l Hydro 100	1158	Die.	12765	635	6	4.300x5.000	436	2400	104.17	1000	101.30	82.13	6.42	9801	14.83	10.50	10.35	10.19	8.95
Hydro 186 Diesel	1257	Die.	13430	None	6	4.300x5.000	436	2400	105.02	1000	100.31	82.77	6.56	11312	13.68	10.06	9.83	9.84	8.46
IH 284	1277	Gas.	3596	1166	4	2.756x2.992	71.3	2600	25.75	1000	24.33	20.64	4.02	2561	11.62	9.54	9.77	8.97	7.52
Int'l 354	1115	Gas.	5925	1890	4	3.875x4.000	143.1	1875	32.58	540	32.22	28.37	5.01	4674	10.36	7.99	9.03	8.55	7.23

Int'l. 454	1097	Die.	7470	2750	3	3.875x5.060	179	2200	40.47	1000	40.47	35.83	4.10	5583	14.68	11.48	12.87	11.85	10.07
Int'l. 454	1096	Gas.	7120	2720	4	3.375x4.390	157	2200	40.86	1000	40.86	35.24	4.13	5329	10.94	8.03	9.22	8.40	7.12
Int'l. 464 Gas	1126	Gas.	7355	2460	4	3.562x4.390	175	2400	45.74	540	43.64	42.20	4.51	5465	10.80	8.00	9.65	8.86	7.70
Int'l. 464 Diesel	1127	Die.	7570	2440	3	3.875x5.060	179	2400	44.42	540	41.73	39.97	4.53	5488	14.41	11.49	12.25	12.57	10.67
484 Utility Dsl.	1312	Die.	7710	2710	3	3.875x5.06	179	2200	42.42	540	41.79	38.06	4.78	5500	14.81	11.85	12.75	12.39	10.63
Int'l. 574	1099	Die.	8675	3525	4	3.875x5.060	238.6	2200	52.55	1000	52.55	46.95	4.40	6446	14.46	11.53	12.86	12.38	10.57
Int'l. 574	1098	Gas.	8250	3415	4	3.813x4.390	200.3	2200	52.97	1000	52.97	45.16	4.39	6360	11.25	8.55	9.63	9.05	7.43
584 Utility & Rowcrop	1313	Die.	8850	3185	4	3.875x4.38	206	2300	52.54	540	50.96	47.47	5.07	6859	15.23	12.34	13.41	12.95	11.10
Int'l. 666 Gas	1152	Gas.	10050	2360	6	3.750x4.390	290.8	2000	66.30	540	66.30	58.68	5.13	7981	11.95	8.45	10.08	9.04	7.27
Int'l. 666 Diesel	1151	Die.	10330	2130	6	3.875x4.410	312	2000	66.29	540	66.29	58.34	5.12	8012	14.24	11.76	12.60	11.98	10.16
Int'l. 674 Utility Gas	1128	Gas.	8330	3035	4	3.812x4.390	200	2400	58.53	540	56.01	53.48	7.04	6583	10.83	8.19	9.40	9.11	8.39
Int'l. 674 Utility Die	1129	Die.	8690	3040	4	3.875x5.060	238.6	2400	61.56	540	58.79	55.91	7.03	6833	15.25	12.16	13.52	13.11	11.31
684 Utility & Rowcrop	1314	Die.	9660	3825	4	3.875x5.06	239	2400	62.52	540	58.75	55.92	5.29	6858	15.55	12.21	13.27	13.02	11.28
686 Diesel 10 Speed	1336	Die.	10340	2360	6	3.875x4.375	310	2000	66.36	543	66.36	58.81	5.08	8043	16.07	13.16	13.93	13.27	11.53
784 Rowcrop Diesel	1315	Die.	9920	3830	4	3.937x5.062	246	2400	67.48	1000	64.09	58.65	5.18	8105	16.06	12.75	13.25	12.77	11.07
Hydro 84 Diesel	1316	Die.	9120	3115	4	3.937x5.062	246	2400	58.73	540	56.68	43.59	7.60	6572	14.01	10.50	10.13	9.82	8.34
Hydro 86 Diesel	1337	Die.	10710	2545	6	3.875x4.375	310	2400	70.89	540	66.64	54.10	4.03	8815	14.18	10.23	9.92	9.55	8.24
Int'l. Hydro 70 Gas	1154	Gas.	10140	2265	6	3.750x4.390	290.8	2400	69.61	540	64.10	54.62	4.57	8427	11.10	7.17	7.654	6.75	5.48
Int'l. Hydro 70 Die	1155	Die.	10430	1990	6	3.875x4.410	312	2400	69.51	540	65.41	53.49	4.03	8310	12.40	9.31	9.451	8.756	6.965
Farmall 766	1117	Die.	12720	1380	6	3.875x5.085	360	2600	85.45	1000	85.66	74.54	6.48	9236	14.85	10.36	12.08	11.05	9.13
Farmall 766	1094	Gas.	11880	1480	6	3.750x4.390	290.8	2400	79.73	1000	73.96	71.44	4.77	88.41	11.78	8.18	9.77	8.68	7.12
886 Diesel	1254	Die.	13040	970	6	3.875x5.085	360	2400	86.14	1000	83.16	75.67	6.35	10485	14.29	10.55	11.77	10.92	9.21
886 Diesel 16 Speed	1338	Die.	13450	1710	6	3.875x5.063	358	2400	86.57	1000	83.91	76.25	4.69	10807	16.01	11.77	12.97	12.21	10.62
886 Dsl. 16 Speed (1)	1339	Die.	13450	1710	6	3.875x5.063	358	2400	90.56	1000	88.23	80.13	4.69	10930	15.84	11.98	12.81	12.38	10.86

(1) Serial No. 2490208 U17026 and up.

Farmall 966	1082	Die.	13500	1875	6	4.300x4.750	414	2400	96.01	1000	93.50	82.75	4.41	10041	15.74	11.38	12.57	12.00	10.28
Farmall 966 Hydro	1095	Die.	12875	1175	6	4.300x4.750	414	2400	91.38	1000	88.29	71.43	8.51	8909	13.80	9.33	9.63	9.19	7.94
Int'l. 966 Diesel	1123	Die.	13670	1970	6	4.300x4.750	414	2600	100.80	1000	101.52	88.94	6.58	10036	15.68	10.94	12.36	11.68	9.84
986 Diesel	1255	Die.	14000	970	6	4.300x5.000	436	2400	105.68	1000	104.18	94.05	6.73	12176	15.56	11.34	12.65	11.72	10.02
F'all 1066 Hyd.Turbo	1083	Die.	13190	1870	6	4.300x4.750	414	2400	113.58	1000	109.32	88.13	6.47	9576	15.54	10.53	10.64	10.07	8.65
Farmall 1066 Turbo	1081	Die.	15170	3025	6	4.300x4.750	414	2400	116.23	1000	112.18	103.95	6.30	11625	16.52	11.47	13.16	12.02	10.13
Int. 1066 Turbo Diesel	1124	Die.	15260	1945	6	4.300x4.750	414	2600	125.68	1000	119.20	108.87	7.03	13000	16.37	11.32	12.78	11.97	9.99
1086 w/Radial Tires	1247	Die.	15640	2925	6	4.300x4.375	414	2400	131.41	1000	133.67	115.82	7.40	13503	16.39	11.90	13.28	12.36	10.45
1086 w/Bias Ply Tires	1247	Die.	15640	3100	6	4.300x4.375	414	2400	131.41	1000	133.67	114.14	6.66	12137	16.39	11.90	12.83	12.08	10.52
Farmall 1466 Turbo	1080	Die.	16230	2750	6	4.300x5.000	436	2400	133.40	1000	125.17	119.14	6.78	13165	16.86	12.30	13.92	12.85	10.96
Int. 1466 Turbo Diesel	1125	Die.	16660	2990	6	4.300x5.000	436	2600	145.77	1000	145.84	127.02	6.93	13673	17.03	11.83	13.03	12.01	10.35
Farmall 1468	1118	Die.	16310	2850	8	4.500x4.313	550	2600	145.49	1000	136.85	129.31	7.33	12932	15.93	12.40	13.87	13.22	11.17
Int'l 1566 Turbo Dsl	1174	Die.	18260	3065	6	4.300x5.000	436	2600	161.01	1000	162.31	140.35	5.64	15774	16.16	11.51	12.55	11.69	9.86
Int'l 1568 Diesel	1175	Die.	17350	2400	8	4.500x4.313	550	2600	150.70	1000	147.79	133.79	5.69	14918	14.99	12.08	13.00	12.59	10.80
1586 w/Radial Tires	1248	Die.	17600	2480	6	4.300x5.000	436	2500	161.55	1000	156.09	140.65	5.55	16665	16.51	12.28	13.02	12.38	10.51
1586 w/Bias Ply Tires	1248	Die.	17600	3010	6	4.300x5.000	436	2500	161.55	1000	156.09	140.08	6.05	15124	16.51	12.28	12.74	12.38	10.54
3388 Diesel	1319	Die.	17850	430	6	4.300x5.000	436	2400	130.61	1000	128.59	114.42	6.67	16764	16.85	12.00	13.52	12.17	10.09
3588 Diesel	1320	Die.	18890	1270	6	4.300x5.350	466	2400	150.41	1000	152.07	130.94	6.65	17589	16.98	12.19	13.13	12.20	10.30
Int'l. 4166	1116	Die.	20010	3685	6	4.300x5.000	436	2400	150.63	1000	152.72	130.57	5.92	19434	16.84	11.86	13.01	11.88	9.93
Int'l. 4366 Turbo D	1153	Die.	23000	1310	6	4.300x5.350	466	2600	....	....	....	168.90	6.65	23138	....	....	12.54	11.98	10.3[illegible]
4386 Diesel	1256	Die.	24930	None	6	4.300x5.350	466	2600	....	....	....	176.02	8.71	23321	....	....	12.43	11.92	10.18
4568	1216	Die.	29870	4120	8	5.3125x4.50	798	2600	....	....	....	235.72	6.76	27995	....	....	12.89	11.79	9.73
4786 Diesel	1317	Die.	34350	4150	8	5.313x4.500	798	2600	....	....	....	265.55	4.79	33468	....	....	12.80	11.92	9.86
Kubota																			
L185	1285	Die.	3370	1430	2	3.000x3.23	45.3	2800	15.33	540	14.07	13.03	5.57	1939	13.60	10.90	10.38	10.82	9.26
L185DT	1286	Die.	3415	1283	2	3.000x3.23	45.3	2800	15.45	540	14.16	12.65	3.94	2322	13.49	11.00	10.34	10.24	8.70
L-210	1071	Die.	3610	1290	2	3.460x3.460	65.3	2700	19.10	540	16.49	14.69	5.03	2020	13.19	10.94	10.86	10.56	9.16
L225 Diesel	1145	Die.	3452	1457	3	3.000x3.200	....	2700	20.86	1000†	19.96	17.69	6.34	2015	14.25	11.12	10.71	10.78	9.36
L245	1283	Die.	3694	1498	3	3.000x3.23	68	2800	22.06	540	20.11	18.66	5.74	2067	13.98	11.07	10.74	10.70	9.16
L245DT	1284	Die.	3792	1410	3	3.000x3.23	68	2800	22.35	540	20.15	18.48	6.06	2419	14.33	11.21	10.88	10.67	9.22
L-260	1072	Die.	4020	1380	2	3.540x3.940	77.6	2600	24.11	540	22.88	19.64	5.12	2575	13.52	13.16	10.45	10.90	8.31
L285 Diesel	1198	Die.	4030	1585	4	2.992x3.228	91	2400	26.45	540	23.58	22.94	6.62	3134	14.63	12.16	11.78	12.16	10.65
M4500DT & M4500 16 Speed	1348	Die.	7800	2635	6	3.23x3.23	158.5	2600	49.72	540	44.49	42.50	6.16	4812	15.19	12.22	11.90	12.02	10.77
M7500DT & M7500 16 Speed	1349	Die.	9510	3530	4	4.134x4.528	243	2400	72.34	540	66.54	61.29	6.65	6327	17.83	14.15	13.93	14.20	12.40

Nebraska Tractor Tests Summarized (Tests from 1971 through 1980)

						ENGINE									—FUEL CONSUMPTION (HP Hours Per Gallon) @:—		—Varying Drawbar Power—		
MAKE AND MODEL OF TRACTOR	Test No.	Fuel Used	Weight With Ballast	Lbs. Ballast Carried	No. of Cylinders	Bore and Stroke	Displacement Cu. in.	Rated RPM Dwbr.	Max. PTO HP @ Rated Engine RPM	Std. PTO RPM	Max. PTO HP @ Std. PTO RPM	Max. Drawbar HP	MPH @ Max. Dwbr. HP	Max. Lbs. Pull	Max. PTO HP @ Std. PTO RPM	PTO Average @ Varying Power	Max. Available Power	75% of Pull Max. Power	50% of Pull @ Max. Power
Lamborghini																			
1056DT	1269	Die.	12050	1700	6	3.86x4.72	331	2220	92.13	1000	89.98	79.51	6.86	9135	15.15	13.02	12.45	12.74	10.93
Leyland																			
245 Diesel	1177	Die.	7850	1970	3	3.600x5.000	152.7	2250	39.73	540	36.38	35.09	4.47	5056	16.31	12.60	13.02	12.67	11.29
255 Diesel	1176	Die.	8610	2310	4	3.822x4.826	222	2200	47.91	540	43.85	43.00	6.58	5891	16.42	11.10	12.78	11.81	9.50
472 & 272 Die. 9-Speed	1341	Die.	11990	4580	4	3.858x4.921	230	2200	63.52	540	58.50	53.27	5.91	7224	14.97	12.28	11.32	11.67	10.48
482 & 282 Die 9 Speed	1340	Die.	12000	4590	4	3.858x4.921	230	2200	74.28	540	70.86	61.19	5.86	7032	17.58	12.63	12.70	12.10	10.09
2100 Diesel	1178	Die.	13260	4350	6	3.860x4.920	344.7	2100	88.40	1000	83.30	75.70	4.95	8617	16.29	13.20	13.16	13.24	11.24
Long																			
360 Diesel	1298	Die.	6410	1930	3	3.74x4.33	143	2400	36.16	540	31.06	31.91	5.20	4808	14.41	11.97	12.45	12.13	10.48
R9500 Special	1107	Die.	13700	5530	6	3.875x5.000	354	2250	97.72	540	88.13	82.94	6.13	10216	16.21	13.25	13.02	13.10	11.14
U445	1108	Die.	7800	3320	3	3.740x4.330	143	2400	41.93	540	36.53	37.55	5.51	5910	13.40	12.01	11.84	13.29	11.39
U550	1109	Die.	9110	4540	4	3.740x4.330	190.7	2400	53.61	540	47.66	48.03	7.15	6944	15.10	12.41	13.09	13.21	11.76
900 Diesel	1163	Die.	12575	4375	4	4.33x4.72	285	2200	72.88	1000	72.86	62.50	6.53	7843	13.06	12.15	10.97	13.00	11.38
Massey-Ferguson																			
MF230 Gasoline	1215	Gas.	4870	1030	4	3.375x4.062	145	2000	34.34	540	31.29	29.58	5.08	3717	11.85	8.72	9.89	8.90	7.85
MF230 Diesel	1214	Die.	5110	1110	3	3.600x5.000	153	2000	34.53	540	30.80	29.66	7.64	4030	18.18	14.81	15.06	14.74	12.87
MF235 Gasoline	1194	Gas.	5785	1655	4	3.375x4.062	145	2250	41.13	540	33.87	35.29	5.86	42.94	10.49	7.99	8.69	8.07	6.69
MF235 Diesel	1187	Die.	5860	1725	3	3.600x5.000	153	2250	42.39	540	35.29	36.29	5.84	4281	16.78	13.52	13.80	13.39	11.56
MF255 Gasoline	1190	Gas.	7280	1140	4	3.875x4.500	212	2000	50.01	540	47.14	43.49	5.28	5668	10.91	8.00	8.94	8.54	6.72
245 Diesel	1251	Die.	6150	2100	3	3.600x5.000	153	2250	42.90	540	36.50	36.75	5.92	4279	16.25	12.72	12.43	12.79	11.13
245 Gasoline	1252	Gas.	6020	2120	4	3.375x4.062	145	2250	41.09	540	34.15	35.50	5.90	4298	11.74	9.07	9.50	9.07	7.88
MF255 Diesel	1189	Die.	7130	1160	4	3.600x5.000	203	2000	50.69	540	45.55	43.72	5.28	5257	15.88	13.32	13.44	13.36	12.24
255 12-Speed	1250	Die.	7310	895	4	3.875x5.000	236	2000	52.68	540	48.37	44.75	7.89	5591	16.92	12.70	13.34	12.82	11.03
MF265 Diesel	1188	Die.	8200	1815	4	3.875x5.000	236	2000	60.73	540	54.76	51.87	5.23	6248	15.88	13.44	13.52	13.51	12.16
MF275 Diesel	1193	Die.	9330	2720	4	3.975x5.000	248	2000	67.43	540	61.76	60.16	5.16	7292	14.18	12.51	13.04	13.22	11.63
MF285 Diesel	1171	Die.	11760	4110	4	4.500x5.000	318	2000	81.96	1000	81.96	70.53	7.77	8846	14.98	12.68	12.85	12.90	11.34
MF1085 Diesel	1133	Die.	14385	2845	4	4.500x5.000	318	2000	81.58	1000	81.58	70.76	5.58	10355	15.82	13.21	13.43	13.15	11.55
MF1105 Diesel	1132	Die.	16725	4405	6	3.875x5.000	354	2200	100.72	1000	96.43	86.26	4.36	7415	15.43	11.53	12.37	11.55	9.81
MF1135 Diesel	1135	Die.	18900	5350	6	3.875x5.000	354	2200	120.84	1000	118.47	106.52	4.56	13955	16.18	12.24	13.22	12.56	10.71
MF1155 Diesel	1134	Die.	20460	5554	8	4.250x5.000	540	2200	140.97	1000	134.11	124.90	4.40	15630	15.66	12.77	13.15	13.00	11.45
MF1500	1086	Die.	20555	3355	8	4.500x4.500	573	3000	....	....	....	152.77	5.30	17295	....	....	12.99	12.49	10.90
MF1505 Diesel	1172	Die.	20970	3010	8	4.500x5.000	636	2800	174.46	1000	175.95	154.10	6.98	17226	14.55	11.41	12.27	11.43	9.54
MF1800	1087	Die.	21760	4430	8	4.500x5.000	636	2800	....	....	....	183.65	7.07	18432	....	....	13.27	13.49	11.93
MF1805 Diesel	1173	Die.	22790	4790	8	4.500x5.000	636	2800	192.65	1000	191.60	170.17	6.95	18781	14.77	12.14	12.76	12.41	10.77
2675 [illegible]-Speed	1321	Die.	14280	1930	6	3.875x5.0	354	2500	100.84	1000	95.00	86.18	5.91	10226	15.00	11.14	11.48	11.57	10.01
2675, 24-Speed	1309	Die.	14495	2065	6	3.875x5.0	354	2500	103.29	1000	96.67	86.99	7.21	9674	15.43	11.56	11.76	11.49	9.95
2705, 8-Speed	1322	Die.	16800	4295	6	3.875x5.0	354	2500	121.00	1000	114.44	101.47	6.17	12588	16.84	11.22	12.54	11.30	9.45
2705, 24-Speed	1310	Die.	17490	4895	6	3.875x5.0	354	2500	122.20	1000	115.85	103.02	7.50	13085	16.65	11.22	12.74	11.27	9.23
2745 Diesel	1311	Die.	19490	4300	8	4.25x4.75	539	2600	143.40	1000	132.21	123.37	7.78	15386	15.40	10.62	11.96	11.13	9.39
MF2775	1278	Die.	20400	4210	8	4.63x4.75	640	2600	165.95	1000	149.86	143.70	5.72	17407	16.05	11.50	12.57	11.52	9.85
2805 24-Speed	1258	Die.	21170	5540	8	4.630x4.750	640	2500	194.62	1000	181.77	160.72	7.10	17369	16.29	11.33	12.21	11.14	9.27
4800 Die 12 & 18 Speed	1342	Die.	30520	None	8	5.5 x4.75	903	2600	179.31	1000	172.88	158.29	3.73	25294	15.10	10.12	12.13	10.73	8.39
4840 Die 12 & 18 Speed	1343	Die.	30920	None	8	5.5 x4.75	903	2600	210.67	1000	210.61	186.36	4.84	28191	15.57	10.77	12.41	11.25	9.32
4880 Die 12 & 18 Speed	1344	Die.	31090	None	8	5.5 x4.75	903	2600	272.81	1000	267.38	244.57	6.54	29272	16.80	11.51	13.50	11.98	9.58
Minneapolis-Moline																			
G955	1161	Die.	12060	None	6	4.375x5.000	451	1800	98.38	1000	98.82	83.40	5.44	8374	13.92	11.93	11.26	11.76	10.29
G1350	1069	Die.	20540	8490	6	4.750x5.500	585	2200	141.44	1000	128.10	125.29	5.70	15620	15.23	12.16	12.33	12.23	10.86
G1355 Diesel	1141	Die.	18070	974	6	4.750x5.500	585	2200	146.62	1000	146.62	128.95	7.89	14178	15.21	12.47	13.61	12.85	11.23
A4T-1600	1070	Die.	19850	None	6	4.750x5.500	585	2200	143.27	1000	125.38	129.48	6.77	18236	14.14	11.76	12.56	12.24	10.79

Oliver																			
2155	1069	Die.	20540	8490	6	4.750x5.500	585	2200	141.44	1000	128.10	125.29	5.70	15620	15.23	12.16	12.33	12.23	10.86
2255 Diesel	1140	Die.	17990	1583	8	4.500x4.500	573	2600	146.72	1000	147.65	126.13	5.70	14770	15.66	12.47	13.43	12.85	11.25
2655	1070	Die.	19850	None	6	4.750x5.500	585	2200	143.27	1000	125.38	129.48	6.77	18236	14.14	11.76	12.56	12.24	10.79
Same																			
Panter 4WD Diesel	1185	Die.	12000	2772	5	3.860x4.720	276	2200	80.02	1000	79.10	66.67	5.75	10389	14.79	12.74	12.40	12.30	10.00
Tiger 1000	1268	Die.	11620	2500	5	4.13x4.72	317	2200	90.45	1000	89.42	78.84	6.35	9116	15.48	13.22	12.41	13.08	11.26
Buffalo 4WD Diesel	1186	Die.	13795	3708	6	4.130x4.720	380	2200	104.94	1000	104.94	88.24	4.24	10941	15.23	12.78	12.47	12.44	10.76
Satoh																			
S650G	1106	Gas.	3640	1400	4	2.677x2.677	60.2	2800	22.03	1000†	20.37	18.78	3.96	2794	9.91	8.38	8.55	9.03	7.88
S750DD & S750D 9 Speed	1347	Die.	5550	1620	3	3.386x4.016	108.4	2500	33.45	540	28.11	28.99	5.93	4295	11.92	10.89	9.86	11.18	9.58
Steiger																			
Wildcat III ST-210 & RC-210	1237	Die.	22260	None	8	4.500x5.000	636	2800	....	....	....	171.44	5.84	21052	....	....	12.71	12.58	10.82
Bearcat	1079	Die.	22650	2086	8	4.500x5.000	636	2800	....	....	....	165.64	5.76	21287	....	....	12.91	12.46	11.04
Bearcat II	1162	Die.	23020	1585	8	4.500x5.000	636	2800	....	....	....	180.69	6.57	22622	....	....	12.79	12.37	10.92
Bearcat III ST-220	1246	Die.	29380	None	6	5.500x6.000	855	2100	....	....	....	175.58	4.84	26936	....	....	13.24	12.60	11.04
Bearcat III PT225	1272	Die.	30825	None	6	4.75x6.00	638	2200	(1)	....	....	180.86	6.33	29749	....	....	12.02	10.80	9.29
Bearcat III 225 without PTO												187.59	5.58	29953	....	....	12.81	11.52	10.07
Couger II	1170	Die.	27995	1305	6	4.750x6.000	638	2200	....	....	....	228.15	4.44	26432	....	....	13.15	12.77	11.59
Cougar III ST-250	1239	Die.	29800	None	6	4.750x6.000	638	2200	....	....	....	210.35	6.38	26612	....	....	12.74	11.90	10.36
Cougar III ST-251	1233	Die.	30840	None	6	5.500x6.000	855	2100	....	....	....	205.82	7.98	26880	....	....	14.74	13.69	11.60
Cougar III PT270	1273	Die.	32210	1495	6	4.75x6.00	638	2200	(1)	....	....	219.39	6.29	30122	....	....	12.73	11.81	10.23
Cougar III 270 without PTO												224.54	4.89	29950	....	....	12.97	12.45	10.76
Cougar III ST-270	1238	Die.	29930	None	6	4.750x6.000	638	2200	....	....	....	228.96	6.38	25731	....	....	13.32	12.62	10.96
Panther III ST-310	1235	Die.	30850	None	6	5.500x6.000	855	2100	....	....	....	261.78	7.90	26757	....	....	13.95	13.09	11.02
Panther III ST-325	1236	Die.	31080	None	6	5.400x6.500	893	2100	....	....	....	281.94	7.93	28189	....	....	14.82	14.19	12.64
PTA-325 10-Speed	1355	Die.	33960	3410	6	5.4x6.5	893	2100	....	....	....	274.88	5.34	31876	....	....	14.26	13.45	11.55
Panther III PT350	1274	Die.	34000	2855	8	5.5x4.75	903	2600	(1)	....	....	305.48	6.51	32276	....	....	14.91	13.75	11.32
Panther III 350 without PTO												311.64	7.38	32059	....	....	15.03	Not Tested	
Tiger II	1169	Die.	22930	2330	8	5.500x4.750	903	2600	....	....	....	270.21	6.73	28097	....	....	13.88	12.70	10.61
Tiger III ST450	1282	Die.	47370	4645	6	6.25x6.25	1150	2109	....	....	....	385.74	5.23	42715	....	....	15.57	Not Tested	

(1) Equipped with controlled hydrostatic pto with 105 output horsepower at 1000 rpm.

Versatile																			
555 Diesel	1331	Die.	25980	6330	8	4.625x4.125	555	2550	184.35	1000	184.35	157.30	4.05	23883	16.33	11.15	12.96	11.17	8.83
835 12 Speed	1356	Die.	28000	3720	6	5.5x6.0	855	2100	198.23	1009	198.23	179.07	6.13	26380	15.13	11.36	13.16	11.87	9.70
875 Diesel	1332	Die.	29480	4160	6	5.5x6.0	855	1750	247.16	1000	247.16	242.03	6.36	26795	16.06	12.02	14.35	12.53	10.34
895 Diesel 12 Speed	1335	Die.	32500	7880	6	5.5x6.0	885	2100	....	....	....	261.63	6.45	29402	....	....	15.15	13.72	11.57
White																			
2-50 Field Boss	1231	Die.	6880	2325	3	3.940x4.330	158	2500	47.02	540	43.94	41.88	4.80	5640	15.80	13.03	13.26	13.49	11.97
2-60 Field Boss	1232	Die.	8990	3830	4	3.940x4.330	211	2400	63.22	540	54.35	54.78	5.07	7352	17.63	13.82	14.40	13.87	11.93
2-70 Diesel	1212	Die.	9630	1000	6	3.875x4.000	283	2200	70.71	1000	70.71	59.47	6.40	7550	14.56	12.28	11.92	12.13	10.72
2-85 Diesel	1213	Die.	12280	580	6	3.875x5.000	354	2200	85.54	1000	85.54	71.93	8.13	9309	14.62	11.72	12.24	11.74	9.71
2-105 Field Boss	1181	Die.	11810	None	6	3.875x5.000	354	2200	105.61	1007	105.61	90.81	6.34	9212	15.76	12.02	12.89	11.95	10.00
2-135	1275	Die.	16360	2225	6	4.56x4.87	478	2200	137.64	1000	138.03	117.67	8.93	11907	14.91	11.38	12.31	11.42	9.73
2-150 Field Boss	1182	Die.	16940	None	6	4.750x5.500	585	2200	147.49	1007	147.49	127.49	5.63	15059	14.46	11.90	12.07	12.14	10.63
4-150 Field Boss	1159	Die.	16960	None	8	4.500x5.000	636	2800	151.87	1000	152.45	133.34	6.34	16925	15.09	11.45	12.46	11.34	9.21
2-155	1276	Die.	16650	None	6	4.56x4.87	478	2200	157.73	1000	162.37	139.68	9.04	14512	15.38	11.91	12.69	11.53	9.97
2-180	1287	Die.	18280	None	8	4.5x5.0	636	2800	181.89	1000	181.89	163.64	6.50	15499	14.38	11.66	12.85	12.48	10.56
4-180 Field Boss	1184	Die.	20600	None	8	4.500x5.000	636	2800	181.07	1000	182.30	156.54	4.59	20469	14.19	11.47	11.79	11.56	9.98
4-210 Field Boss	1318	Die.	23735	None	8	4.5x5.0	636	2800	182.44	1000	182.44	162.25	5.89	22934	14.26	11.53	12.34	12.10	10.25
Yanmar																			
YM240 Diesel	1199	Die.	3305	1355	2	3.543x3.543	70	2400	19.76	540	18.75	16.60	4.86	2442	15.05	12.64	12.35	11.95	10.37

†See complete test fpr data @ 540 rpm.

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Aggressive selling starts early for this dealer

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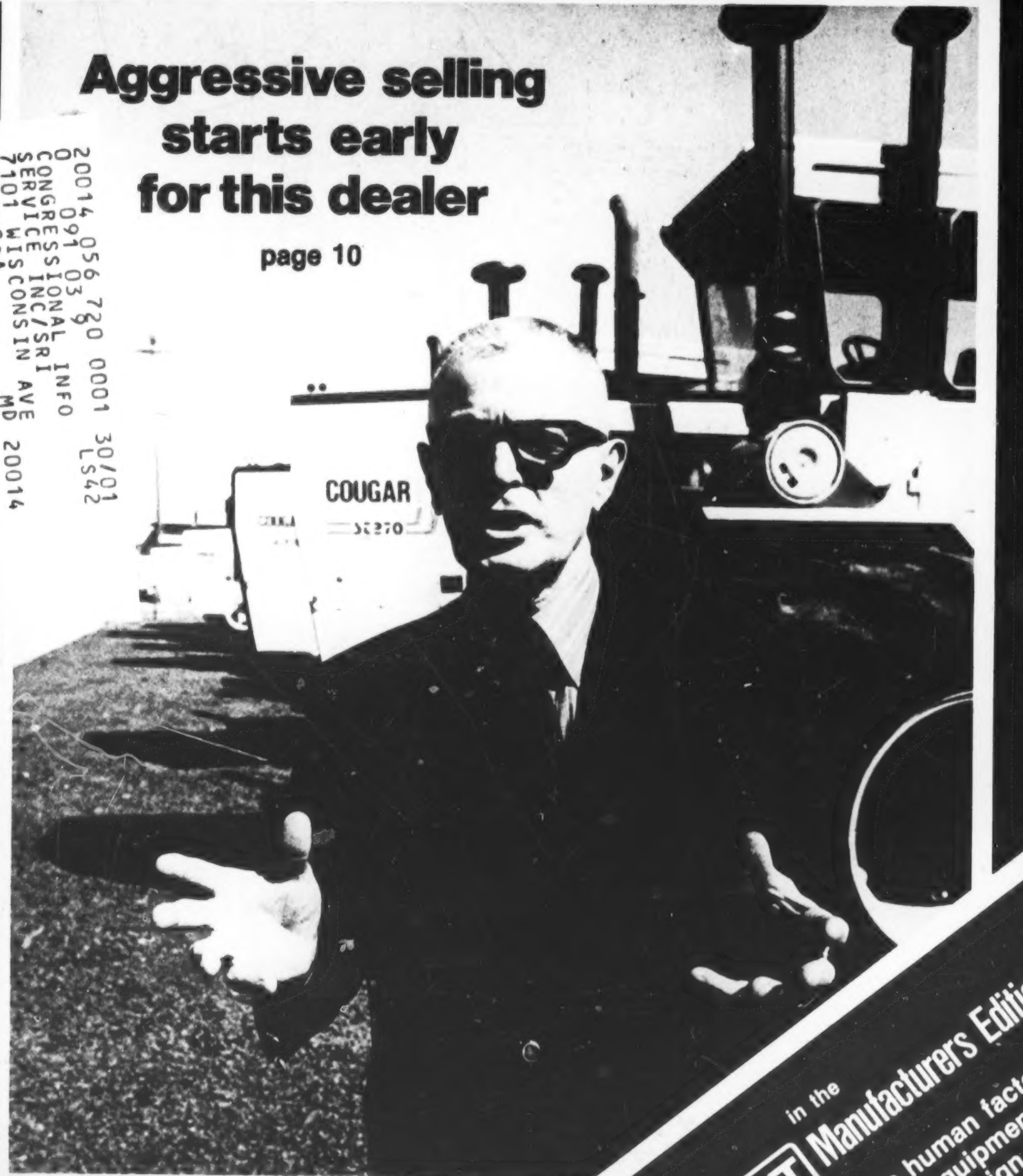

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in this issue...

6: More About Data Processing. Help is available to dealers wanting to set up a data processing system through independent consultants, the NFPEDA and some manufacturers.

10: This Dealer Starts Early. Early-morning sales meetings are credited by dealer Art Helbling with helping to achieve a record sales volume at his Moscow, Idaho, dealership.

14: The Smithfield Show. High interest rates, reduced sales and large inventories resulted in a bad year for Britain's farm equipment industry...but, there were some new products shown with hopes for a better year in 1981.

30: New Combines from Massey-Ferguson. Three new combines are introduced that are claimed by the manufacturer to be up to 15 per cent larger in harvesting capacity than the models they succeed.

On the cover...Art Helbling, general manager of Helbling Bros., Inc., uses some innovative, and successful, sales management techniques at his family's Steiger and International Harvester dealership.

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what's ahead...

I&T
SINCE 1886

February 7, 1981

RETAIL SALES OF FARM EQUIPMENT in the United States were down substantially in December, according to the flash report of the Farm & Industrial Equipment Institute, countering the strong, upbeat pace set in November. With tractor sales for the year off 14 per cent, many industry marketers were calling 1980 the worst year for the business in the post-World War II era. Monthly retail tractor sales declined steadily in the first six months (April was worst--off 47 per cent), then alternately rose and fell in the second half.

Unit Retail Sales

	December			January-December		
Equipment	1980	1979	Pct. Change	1980	1979	Pct. Change
Farm Wheel Tractors						
2-wheel drive						
40-100 hp	3,308	3,600	- 8.1	58,191	65,000	-10.5
Over 100 hp	2,724	4,408	-38.2	50,332	62,535	-19.5
Total 2-wh dr	6,032	8,008	-24.7	108,523	127,535	-14.9
4-wheel drive	906	999	- 9.3	10,886	11,455	- 5.0
Total	6,938	9,007	-23.0	119,409	138,990	-14.1
Combines (S-P)	1,687	1,932	-12.7	25,722	32,246	-20.2
Balers*	397	350	13.4	14,005	18,750	-25.3
Forage Harvesters**	336	425	-20.9	9,453	12,451	-24.1
Mower Conditioners	742	639	16.1	19,449	25,600	-24.0

*Bales under 200 lbs. **Shear-bar type.

BUT THE SAME INDUSTRY MARKETERS GENERALLY LIKE THE LOOKS OF 1981. According to the State-of-the-Industry forecast of the FIEI, unit retail sales this year are expected by consensus to rebound strongly in almost all field equipment product categories. Tractors--up 7.7 per cent; combines--up 14.7 per cent; big balers--up 15.5 per cent; conventional balers--up 5.3 per cent; manure spreaders--up 21.4 per cent. A detailed report of the industry outlook will appear in I&T February 21.

DEPT. OF AGRICULTURE 1982 BUDGET currently calls for an increase from 1981's $20.9 billion to $28.0 billion. Of that budget, only 21 per cent ($5.8 billion) is devoted to farm programs; $17.2 billion or 61 per cent goes to consumer food and nutrition assistance programs. The 1981 budget allows $3.1 billion (15 per cent) for farmer programs and $15.6 billion (75 per cent) for food programs.

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RETAIL SALES OF WHEEL TRACTORS*

(In Units)

	Total Wheel Tractors†				Cumulative for Jan.-Oct., 1979				Cumulative for Jan.-Oct., 1980			
	Oct., 1979		Oct., 1980		Farm Type				Farm Type			
	Farm	Non-Farm	Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm
Alabama	296	66	180	33	2,440	38	2,478	573	1,947	60	2,007	346
Alaska	5	6	2	4	19	1	20	36	24	6	30	37
Arizona	125	86	179	51	596	99	695	601	737	81	818	418
Arkansas	554	85	372	75	3,341	241	3,582	628	2,702	302	3,004	466
California	644	458	653	311	4,066	328	4,394	3,349	3,783	333	4,116	2,381
Colorado	169	103	208	74	947	164	1,111	644	995	189	1,184	555
Connecticut	15	40	14	24	163	2	165	244	207	5	212	185
Delaware	29	2	15	3	203	19	222	47	128	9	137	35
Florida	318	181	276	112	1,995	79	2,074	1,537	2,204	95	2,299	1,025
Georgia	417	95	256	94	3,366	39	3,405	802	2,627	45	2,672	528
Hawaii	7	11	6	4	49	4	53	95	61	2	63	80
Idaho	202	21	231	13	941	158	1,099	185	1,007	169	1,176	126
Illinois	1,161	213	1,048	107	6,035	794	6,829	1,550	4,710	750	5,460	751
Indiana	694	95	503	54	3,749	465	4,214	820	2,759	419	3,178	416
Iowa	1,388	56	1,173	20	7,996	692	8,688	426	5,330	618	5,948	244
Kansas	570	50	545	28	3,751	570	4,321	358	3,119	634	3,753	290
Kentucky	489	103	378	62	4,027	98	4,125	752	3,377	65	3,442	446
Louisiana	374	94	319	59	2,250	165	2,415	787	2,318	223	2,541	545
Maine	38	18	21	12	209	2	211	128	221	3	224	83
Maryland	104	68	83	50	726	38	764	476	615	28	643	304
Massachusetts	13	47	16	32	126	.....	126	324	131	1	132	251
Michigan	405	254	401	83	2,555	243	2,798	1,356	2,140	261	2,401	709
Minnesota	945	87	895	51	5,435	868	6,303	678	3,851	625	4,476	335
Mississippi	381	46	326	47	3,024	141	3,165	551	2,786	221	3,007	355
Missouri	735	110	537	74	4,824	256	5,080	872	3,382	215	3,597	527
Montana	127	20	160	27	818	409	1,227	166	1,010	253	1,263	194
Nebraska	539	38	611	28	3,915	296	4,211	266	2,884	325	3,209	168
Nevada	15	42	13	12	115	9	124	200	103	11	114	111
New Hampshire	36	14	17	26	132	1	133	106	127	2	129	92
New Jersey	32	97	32	49	275	8	283	649	264	4	268	439
New Mexico	41	58	42	24	415	23	438	310	365	19	384	202
New York	402	147	294	99	2,388	110	2,498	1,044	2,180	94	2,274	795
North Carolina	538	81	508	66	3,600	68	3,668	833	3,016	49	3,065	562
North Dakota	381	39	391	16	2,201	1,028	3,229	224	1,454	691	2,145	127
Ohio	685	196	511	98	4,005	364	4,369	1,596	3,157	318	3,475	783
Oklahoma	418	98	317	79	3,105	418	3,523	689	2,346	327	2,673	554
Oregon	182	64	189	61	1,144	94	1,238	491	1,203	70	1,273	358
Pennsylvania	283	200	232	98	2,126	37	2,163	1,358	1,921	48	1,969	927
Rhode Island	4	9	1	5	23	.....	23	40	15	.....	15	40
South Carolina	225	48	132	45	1,654	37	1,691	439	1,291	43	1,334	332
South Dakota	325	19	241	20	2,124	315	2,439	169	1,419	231	1,650	86
Tennessee	379	84	289	63	3,571	63	3,634	839	2,655	85	2,740	411
Texas	1,429	606	1,332	374	9,206	562	9,768	3,970	8,428	543	8,971	3,126
Utah	78	52	78	50	624	17	641	422	569	24	593	317
Vermont	70	8	51	7	360	8	368	68	310	3	313	42
Virginia	326	80	246	39	2,272	17	2,289	647	1,915	23	1,938	491
Washington	206	109	285	54	1,472	180	1,652	780	1,669	165	1,834	417
West Virginia	81	34	34	19	554	.....	554	243	409	.....	409	173
Wisconsin	697	94	642	60	5,108	229	5,337	675	4,131	217	4,348	432
Wyoming	50	30	62	22	381	37	418	225	324	39	363	143
U.S. Government	5	14	7	11	130	.....	130	534	220	.....	220	590
Miscellaneous‡	1	142	30	37	44	4	48	1,461	302	.....	302	496
TOTAL	17,613	4,818	15,384	2,966	114,595	9,838	124,433	36,262	94,848	8,943	103,791	23,850

Data released December 19, 1980, Farm & Industrial Equipment Institute.

*Figures do not include garden tractors, motor tillers or contractors off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland Satoh); Allis-Chalmers; Belarus; J I Case; Deere; Deutz; Ford; International Harvester; Long; Massey-Ferguson; R. M. Wade (Satoh); Steiger; Versatile; and White.

†The monthly sales are those reported for that month only. The cumulative totals are subject to revisions reflecting updating in the basic sales data.

‡Sales reported as miscellaneous are retail sales that cannot be classified by state or as U.S. Government.

I&T
SINCE 1886

AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

YODER & FREY, INC.
Archbold, Ohio
(January 12, 1981)

ALLIS-CHALMERS TRACTORS

7000 diesel, 1975 (Good)	8100*
5040 diesel, 1977 (Good)	4000
200, 1973 (Good)	8600*
XT190 diesel, 1968 (Fair)	2975
XT190 diesel, 1967 (Fair)	5450*
180 diesel, 1968 (Fair)	5300*
180, 1967 (Fair)	3400*
D19, 1963 (Good)	2350
D15, 1965 (Fair)	1400
WD45, 1956 (Fair)	935
WD45, 1956 (Fair)	925
WD45, 1956 (Rough)	850
WD, 1954 (Fair)	600

DAVID BROWN TRACTORS

4600, 1970 (Good)	1600*
1200, 1969 (Fair)	2800*
1200, 1960 (Fair)	2500
990, ldr., 1962 (Rough)	1250
880, 1960 (Fair)	1100
880, 1960 (Fair)	1050

CASE TRACTORS

1070 diesel, 1973 (Rough)	5200*
1030 diesel, 1967 (Good)	4500*
1030 diesel, 1963 (Fair)	3200*
830, 1963 (Good)	1400*
430, 1962 (Fair)	1375
400 diesel, 1954 (Fair)	700
400, ldr., 1956 (Rough)	610

JOHN DEERE TRACTORS

8630 diesel, 1975 (Good)	31,250
5020 diesel, 1969 (Fair)	6250
5020 diesel, 1968 (Good)	7800*
4630 diesel, 1978 (Excellent)	17,600*
4630 diesel, 1978 (Excellent)	15,500*
4630 diesel, duals, (Good)	15,200
4430 diesel, 1975 (Good)	12,500*
4320 diesel, 1971 (Good)	9750*
4320 diesel, 1971 (Good)	9700*
4230 diesel, 1975 (Fair)	11,500
4020 diesel, 1969 (Good)	8900*
4020 diesel, 1968 (Excellent)	7600
4020 diesel, 1968 (Good)	7050
4020, 1967 (Good)	4300*
4020 diesel, 1965 (Good)	6175
4020 diesel, 1965 (Fair)	5700
4020 diesel, 1964 (Good)	6750
4020 diesel, 1964 (Good)	6550
4020 diesel, 1964 (Good)	6150*
4020 diesel, 1964 (Fair)	5150*
3020 diesel, 1967 (Fair)	4400*
3020, 1967 (Good)	3700
3020 diesel, 1966 (Good)	5500*
3010 diesel, 1962 (Rough)	3700*
3010, 1961 (Fair)	3400
3010, 1961 (Rough)	2900*
2010, 1963 (Good)	2300
1020, 1967 (Fair)	2800*
1010, ldr., 1962 (Fair)	3000*
820 diesel, 1956 (Fair)	2400
730 diesel, 1960 (Fair)	2350*
720, 1956 (Good)	1975
620, 1954 (Fair)	1150*
420, ldr., 1956 (Fair)	850
70, 1954 (Fair)	800*
70, 1954 (Rough)	675*
70 diesel, 1953 (Fair)	985
60, 1953 (Fair)	675
50, 1954 (Rough)	560

DEUTZ TRACTOR

90-06, 1972 (Fair)	4600*

FERGUSON TRACTORS

35, ldr., 1958 (Good)	1625
TO20, 1946 (Good)	1325

FORD TRACTORS

9600 diesel, 1974 (Rough)	6400
8000 diesel, duals, 1970 (Fair)	7000
6000, 1959 (Fair)	1800*
5000, duals, 1970 (Good)	4500
4000, 1971 (Rough)	2050*
4000 diesel, 1970 (Fair)	3200*
4000, 1970 (Rough)	2100*
3600 diesel, (New)	9200*
3600 diesel, (New)	9000*
3000 diesel, ldr., 1971 (Good)	3550
3000, 1970 (Fair)	3175
3000, 1969 (Fair)	2100
901, (Fair)	900
860, ldr., 1958 (Good)	2650*
541, 1958 (Rough)	1100*
Jub., 1953 (Rough)	1450
8N, 1952 (Good)	1475
8N, 1952 (Fair)	1175
8N, 1952 (Fair)	1100*
8N, 1950 (Fair)	1110*
8N, 1950 (Fair)	1000
8N, 1950 (Fair)	900*
8N, 1950 (Rough)	825
8N, 1950 (Rough)	775
9N, ldr., 1945 (Good)	1500*
9N, 1945 (Fair)	975*
9N, 1945 (Rough)	620
9N, 1944 (Fair)	1050*
9N, 1943 (Rough)	725*

INTERNATIONAL HARVESTER TRACTORS

2424, ldr., 1972 (Fair)	3400*

turbo® Precleaners

The No. 1 PRECLEANER

Eliminates up to 90% of dust, dirt, chaff, rain and snow!

- Extends filter life up to 10 times longer.
- Extends engine life.
- No exhaust connections.

Traffic stopping display moves precleaners off the shelf.

- Free merchandising aids.
- Advertising in leading farm publications.
- Full one year or 3,000 hour warranty.

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PHONE (612) 529-9186

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ORDER HOSE ASSEMBLY SUPPLIES
TOLL FREE

EARN THESE DISCOUNTS:

Hyd Hose 50-10-10-10-10-10%
Hydraulic Couplings 50-10-10%

$178.00 Bonus on a New Davies Crimp System

Free Freight $100 Orders

ORDER TODAY!

DAVIES Mfg. Co.
PRATT, KS. 67124

TOLL FREE
1-800-835-2705

Circle (23) on Reply Card

STROKE CONTROL
SEGMENTS

The simplest, most reliable way to control the stroke on air or hydraulic cylinders

Flat Springs Make Them Easy To Open and Snap on Shaft

Fits Shaft Sizes:
1⅛" 1¼" 1⅜"
1½" 1¾" 2"

WADLER MFG. CO.
Dept. 101, 12th & State Line Road
Galena, Kansas 66739

Circle (36) on Reply Card

1466 diesel, 1975 (Excellent)	13,500
1206 diesel, 1967 (Good)	6950*
1206 diesel, 1964 (Fair)	5700*
1086 diesel, 1978 (Good)	16,000*
1066 diesel, 1975 (Excellent)	12,800*
1066 diesel, 1975 (Excellent)	11,750
1066 diesel, 1972 (Fair)	9200*
1066 diesel, 1973 (Fair)	8300*
856 diesel, 1967 (Fair)	7300
856, duals, 1967 (Fair)	7150
826, duals, 1970 (Good)	7150
544, 1973 (Good)	3525
504, 1963 (Fair)	2200
400, 1956 (Fair)	1260
966 diesel, 1972 (Fair)	7875
806, 1965 (Good)	5500
806 diesel, 1964 (Good)	5850
806 diesel, 1964 (Good)	5700
806 diesel, 1964 (Good)	5175*
806, 1964 (Rough)	2150
806 diesel, 1963 (Fair)	4900*
300, 1956 (Fair)	1000*
300, 1966 (Fair)	875*
240, 1960 (Fair)	840
Sup. M, 1952 (Good)	1175
Sup. M, 1952 (Good)	1150
M, 1951 (Good)	950
M, 1951 (Good)	825
M, 1951 (Fair)	785
M, 1951 (Fair)	775
M, 1950 (Fair)	710
H, ldr., 1950 (Good)	885
H, 1950 (Fair)	800
Sup. C, 1952 (Fair)	575*
C, 1950 (Fair)	580
BN, 1949 (Fair)	550

MASSEY-FERGUSON TRACTORS

2675 diesel, 1978 (Excellent)	16,000*
1800 diesel, 1974 (Fair)	8600*
1135 diesel, 1969 (Fair)	9600
1130 diesel, 1969 (Fair)	6500
230, (New)	6400*
180 diesel, 1970 (Good)	3700
180, 1970 (Fair)	3700*
180, duals, 1970 (Fair)	3200
165, ldr., bld., 1969 (Good)	4675
165 diesel, 1968 (Fair)	3625
165 diesel, 1966 (Good)	3625
165 diesel, 1966 (Rough)	2625
135, 1974 (Rough)	7100*
Sup. 90, 1962 (Rough)	1870
65, 1958 (Fair)	2200*
65, 1958 (Rough)	1500*
35 diesel, 1958 (Fair)	1850*
30, 1970 (Rough)	3100*
30, 1970 (Fair)	2450

OLIVER TRACTORS

1850 diesel, 1966 (Good)	4100*
1800 diesel, 1963 (Fair)	3000
1800, 1963 (Good)	2900*
1800, ldr., 1962 (Fair)	2700*
1800, 1961 (Good)	2750*
1800, 1961 (Fair)	2300*
1750, 1972 (Fair)	3250*
1650 diesel, 1966 (Fair)	3750*
1650, 1966 (Fair)	3600*
1600 diesel, 1962 (Good)	2950
1600, 1961 (Fair)	2300
1600, 1962 (Good)	2000*
880, 1961 (Fair)	1150*
770, 1960 (Fair)	1000*
Sup. 88, 1957 (Rough)	650*
77, 1957 (Good)	650
55, 1954 (Fair)	1075*

WHITE TRACTORS

4-180 diesel, 1976 (Fair)	15,500
4-150 diesel, 1977 (Good)	16,000*

NOTES

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.
Prices reported are NOT averages.

Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

DEMONSTRATOR means—used for demonstrating only and in practically new condition.

Don't sell too low...

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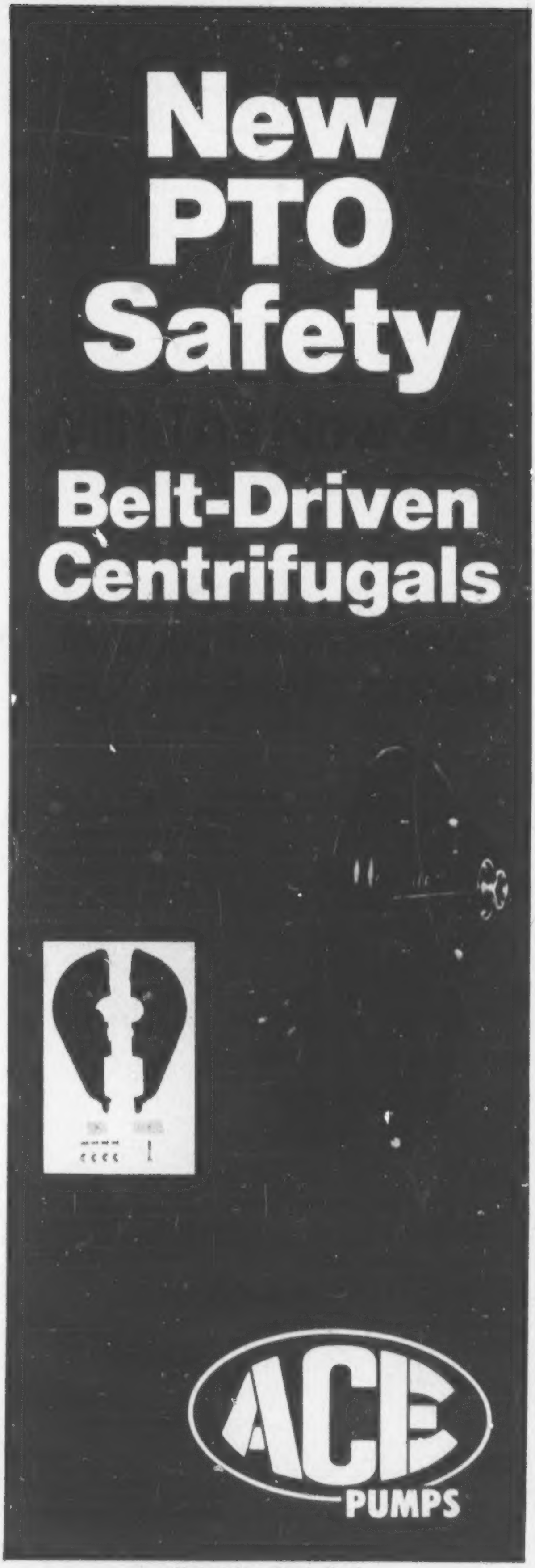

Circle (24) on Reply Card

RETAIL SALES OF SELECTED FARM EQUIPMENT— Jan.-Oct., 1979 and 1980 (1)

(In Units)

	Combines Self-Propelled		Corn Heads		Hay Balers (2)		Windrowers Self-Propelled Power Units		Windrowers Self-Propelled Total Heads		Grinder-Mixers		Sheer-Bar Forage Harvesters (3)	
	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980
Alabama	439	206	99	57	244	135	1	2	1	1	196	108	54	30
Alaska	3	5	.....	.....	6	17	.....	3	.....	4	.....	1	.....	.....
Arizona	30	52	5	5	41	43	57	60	64	72	4	7	15	11
Arkansas	1,006	585	11	5	414	173	2	.....	1	.....	52	64	22	11
California	226	259	56	52	233	160	275	262	302	289	13	5	69	62
Colorado	290	313	139	139	495	407	278	207	285	222	61	57	178	81
Connecticut	2	.....	1	.....	65	53	.....	.....	.....	.....	2	1	64	34
Delaware	53	35	34	38	18	11	.....	1	.....	1	10	8	13	10
Florida	130	63	69	45	102	64	2	.....	2	.....	59	39	23	22
Georgia	672	293	478	275	232	168	1	1	1	1	468	225	126	89
Hawaii	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Idaho	354	388	10	14	485	582	348	379	361	387	35	51	67	63
Illinois	3,031	2,315	3,110	2,414	389	317	15	22	15	22	597	421	328	229
Indiana	1,720	1,219	1,766	1,342	409	302	12	8	12	8	537	316	224	162
Iowa	3,097	2,508	3,554	2,668	451	306	259	124	255	130	1,829	1,049	866	507
Kansas	1,661	1,583	364	301	491	287	394	257	406	268	306	200	326	225
Kentucky	517	283	365	240	447	275	3	3	4	3	287	258	208	160
Louisiana	615	396	1	3	154	60	.....	.....	.....	.....	13	17	19	18
Maine	2	7	.....	.....	86	67	3	2	3	2	1	1	59	39
Maryland	139	112	147	136	131	107	8	11	7	12	46	31	103	70
Massachusetts	.....	.....	.....	.....	56	47	1	6	.....	6	1	3	30	33
Michigan	499	422	448	387	468	362	79	61	83	62	238	205	449	349
Minnesota	1,784	1,353	1,592	1,169	941	688	743	609	766	627	839	489	1,092	765
Mississippi	816	442	8	6	199	75	.....	1	.....	1	59	38	72	59
Missouri	1,475	848	821	448	665	398	82	81	84	88	581	428	197	171
Montana	369	374	5	4	396	364	487	401	525	446	67	58	46	32
Nebraska	1,609	1,361	1,507	1,260	251	197	499	271	505	285	558	419	452	321
Nevada	3	3	.....	.....	54	38	74	54	78	58	1	2	6	7
New Hampshire	.....	.....	.....	.....	57	57	1	.....	1	.....	2	.....	34	28
New Jersey	41	24	13	14	62	37	.....	.....	.....	.....	11	7	22	15
New Mexico	29	36	12	14	166	124	95	60	94	63	18	11	11	6
New York	136	142	162	175	766	730	72	65	72	66	115	103	917	721
North Carolina	581	319	478	333	305	272	3	2	3	2	230	144	122	76
North Dakota	1,264	888	58	52	91	49	897	543	965	587	167	121	137	134
Ohio	1,418	958	1,276	886	685	498	14	8	14	8	475	326	316	230
Oklahoma	553	499	11	21	890	375	163	96	168	103	139	106	56	32
Oregon	203	216	6	8	317	395	244	242	250	263	30	23	72	42
Pennsylvania	238	151	232	231	932	700	67	49	68	51	298	249	666	466
Rhode Island	.....	.....	.....	.....	6	7	.....	7	.....	6	1	.....	1	1
South Carolina	329	158	176	116	100	68	.....	.....	.....	.....	113	58	35	34
South Dakota	636	433	441	237	177	92	763	497	825	542	363	267	442	358
Tennessee	615	281	193	137	593	374	.....	1	.....	1	241	165	204	127
Texas	919	894	265	285	1,395	648	112	83	123	88	220	208	82	76
Utah	40	37	8	7	317	321	146	124	148	134	69	29	94	93
Vermont	.....	1	.....	1	128	107	1	4	1	4	2	.....	166	142
Virginia	214	96	189	106	466	362	7	7	7	7	141	84	223	162
Washington	365	407	66	30	340	429	207	178	219	180	19	17	90	129
West Virginia	3	4	4	5	259	152	.....	1	.....	1	31	22	49	24
Wisconsin	469	538	526	622	1,933	1,399	385	368	389	374	565	466	2,140	1,708
Wyoming	47	46	13	6	203	184	190	185	200	201	22	18	45	35
U.S. Government	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous(4)	.....	.....	.....	6	.....	.....	.....	.....	.....	.....	6	.....	.....	.....
TOTAL	26,647	21,554	18,721	14,301	18,133	13,083	7,010	5,346	7,327	5,676	10,138	6,925	11,032	8,201

Data released December 19, 1980, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled.
(4) Sales reported as miscellaneous are retail sales that cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

Mower Conditioners All Types		Manure Spreaders Conveyor-Type		
1979	1980	1979	1980	
231	130	16	17	Alabama
1	5	1	1	Alaska
6	9	8	6	Arizona
565	344	108	78	Arkansas
47	40	73	48	California
164	152	65	55	Colorado
89	89	71	56	Connecticut
17	16	66	50	Delaware
108	70	28	23	Florida
265	211	46	43	Georgia
1	.....	2	1	Hawaii
117	157	109	98	Idaho
746	569	855	491	Illinois
685	472	650	417	Indiana
1,441	1,005	2,179	1,115	Iowa
976	567	236	176	Kansas
1,177	761	289	226	Kentucky
121	44	24	25	Louisiana
119	111	111	95	Maine
169	106	210	167	Maryland
80	48	64	66	Massachusetts
749	631	712	611	Michigan
1,428	982	1,710	1,180	Minnesota
188	98	31	18	Mississippi
1,715	1,103	411	277	Missouri
121	144	47	44	Montana
597	434	502	303	Nebraska
12	8	5	5	Nevada
68	68	48	48	New Hampshire
74	54	54	41	New Jersey
33	18	8	9	New Mexico
1,223	1,082	1,344	1,142	New York
362	245	149	126	North Carolina
168	126	103	92	North Dakota
1,072	734	923	687	Ohio
934	576	30	47	Oklahoma
184	286	108	96	Oregon
1,182	867	1,214	1,007	Pennsylvania
6	4	1	.....	Rhode Island
132	73	29	26	South Carolina
145	79	333	184	South Dakota
915	535	167	145	Tennessee
1,494	1,020	142	126	Texas
178	177	89	94	Utah
246	233	246	193	Vermont
726	632	224	202	Virginia
153	246	130	111	Washington
235	160	84	51	West Virginia
3,054	2,334	2,585	1,796	Wisconsin
65	50	46	36	Wyoming
.....	.....	.....	.....	U.S. Government
.....	.....	1	2	Miscellaneous
24,584	17,885	16,687	11,975	TOTAL

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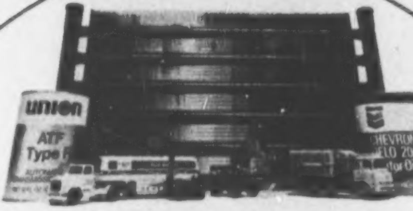

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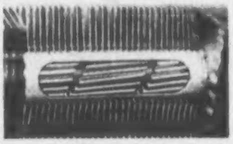

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The Dinkel brothers: Making it as harvest equipment specialists

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February 21, 1981 • Vol. 96 • No. 5

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

12: **A Tractorless Dealership.** A Norfolk, Neb., dealership has been very successful specializing in harvesting equipment with heavy emphasis on parts and advertising, and a service attitude that produces a high level of employee productivity.

18: **Industry Outlook.** Tractor and field equipment manufacturers at FIEI's Marketing & Management Conference predict rebounds in unit retail sales, while agriequipment companies are less enthusiastic.

24: **Wages and Salaries.** I&T reviews studies of employee incomes from three surveys of dealerships in six states.

34: **More About the Tractor Census.** I&T editor Bill Fogarty analyzes the latest U.S. tractors-on-farms totals for the 50 states, and raises some questions for suppliers of belts, tires, filters, lubricants, and replacement parts.

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I&T
SINCE 1886

AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

JONES FARM EQUIPMENT CO
Dothan, Alabama
(January 13, 1981)

ALLIS-CHALMERS TRACTORS

200 diesel, 1973 (Good)	6400
200 diesel, 1973 (Good)	6000
190 diesel, 1968 (Fair)	2750

CASE TRACTORS

730 diesel, 1963 (Rough)	700
580B diesel, ldr., backhoe, 1972 (Excellent)	7300

DEUTZ TRACTOR

4006 diesel, (Good)	1800

DAVID BROWN TRACTORS

990 diesel, 1968 (Excellent)	2500*
990 diesel, 1965 (Fair)	1350
990 diesel, 1965 (Good)	1700

MASSEY-FERGUSON TRACTORS

1105 diesel, 1975 (Good)	7350
1085 diesel, 1973 (Good)	5100
285 diesel, 1976 (Good)	6700
275 diesel, 1979 (Excellent)	7900
275 diesel, 1975 (Good)	5900*
235 diesel, 1975 (Good)	4250
180 diesel, 1967 (Good)	3600
175 diesel, 1971 (Excellent)	4300
175 diesel, 1971 (Excellent)	4300
175 diesel, 1968 (Good)	4000
175 diesel, 1967 (Good)	3700*
165 diesel, 1970 (Good)	3350
165 diesel, 1970 (Good)	3300
165 diesel, 1968 (Good)	3000
165 diesel, 1968 (Good)	2900*
165 diesel, 1967 (Good)	3450
165 diesel, 1967 (Good)	3300
165 diesel, 1966 (Good)	3360*
165 diesel, 1966 (Good)	3550
165 diesel, 1966 (Good)	3000
165 diesel, 1966 (Good)	3250
165 diesel, 1966 (Good)	3200*
150 diesel, 1967 (Excellent)	2800*
150 diesel, 1965 (Good)	2500
150 diesel, 1965 (Fair)	1900*
135, 1973 (Excellent)	3600
135 diesel, 1971 (Excellent)	3850
135, 1971 (Excellent)	3700
135, 1967 (Good)	2650
135 diesel, 1967 (Rough)	2150
65 diesel, 1963 (Good)	1950
65, 1963 (Excellent)	2450
65 diesel, 1960 (Good)	1950
50 diesel, ldr., backhoe, 1974 (Excellent)	7000
50 diesel, ldr., backhoe, 1974 (Excellent)	7400
50 diesel, ldr., backhoe, 1970 (Good)	5400
50, 1960 (Fair)	950
50, 1962 (Good)	2000*
35 diesel, 1963 (Excellent)	2500
35 diesel, 1963 (Excellent)	2300
35 diesel, 1962 (Good)	1875
35 diesel, 1960 (Excellent)	2400
35, 1956 (Good)	1825*
30 diesel, 1971 (Good)	2150
TO 30, 1952 (Rough)	450
TO 20, 1950 (Good)	850
TO 20, 1949 (Fair)	700

FORD TRACTORS

8600 diesel, cab, 1975 (Excellent)	8100*
5000 diesel, 1975 (Excellent)	5300*
5000 diesel, 1975 (Excellent)	5550
5000 diesel, 1968 (Good)	3500
5000 diesel, 1966 (Excellent)	4600
4600 diesel, 1978 (Excellent)	8800
4000 diesel, 1968 (Excellent)	4000*
4000, 1963 (Good)	1600*
3600 diesel, 1979 (Excellent)	7000*
3550, ldr., (Good)	3500
3000, 1970 (Excellent)	3700
3000 diesel, 1968 (Good)	3200
3000, 1968 (Excellent)	3550
3000, 1968 (Excellent)	3550
3000, 1968 (Excellent)	3500*
3000 diesel, 1967 (Good)	3200*
3000, 1965 (Good)	2700
2000 diesel, (Rough)	350
1600 diesel, (Excellent)	3000
861 diesel, 1958 (Rough)	1050
851 diesel, 1958 (Good)	2000
841, 1959 (Fair)	1400
841, 1958 (Excellent)	2150
650, 1955 (Good)	1700*
641 diesel, 1958 (Good)	1800
641 diesel, 1958 (Fair)	1250
640, ldr., 1955 (Fair)	875
Major diesel, 1954 (Fair)	675*
NAA, 1954 (Good)	1450
Jub., 1953 (Good)	1400
Jub., 1953 (Good)	1500
Jub., 1953 (Fair)	1050
8N, 1952 (Excellent)	1500
8N, 1952 (Excellent)	1650
8N, (Good)	1325*

INTERNATIONAL HARVESTER TRACTORS

2500 diesel, ldr., (Good)	2400
1566 diesel, 1974 (Good)	10,100
1066 diesel, 1975 (Good)	9250
966 diesel, cab, 1973 (Excellent)	8900
806 diesel, 1967 (Excellent)	4850
656 diesel, 1968 (Good)	3200*
656 diesel, 1967 (Good)	3400*
574 diesel, 1973 (Good)	4700*
544 diesel, 1972 (Fair)	2100
504, 1963 (Fair)	775
460, 1959 (Rough)	775*
444 diesel, 1968 (Rough)	1500
Sup. M, 1953 (Excellent)	1000
H, 1951 (Good)	450
C, 1948 (Good)	625
Cub, cult., plow, 1948 (Fair)	775*
Cub, cult., plow, 1948 (Good)	1150*
Cub, cult., 1948 (Good)	1150
Cub, ldr., 1948 (Fair)	875*
Cub, mo., 1948 (Fair)	750*
Cub, 1948 (Rough)	325
Cub, cult., plt., plow, har., 1948 (Fair)	750
A, 1941 (Good)	325

JOHN DEERE TRACTORS

4430 diesel, 1973 (Good)	10,800
4020 diesel, 1970 (Good)	5500*
4020 diesel, 1969 (Excellent)	7350
4020 diesel, 1965 (Good)	6400*
4010 diesel, 1963 (Fair)	3250
3020 diesel, 1965 (Good)	5150
3020, LP, 1965 (Fair)	2900*
2630 diesel, 1975 (Excellent)	6100*
2030 diesel, 1973 (Excellent)	4800*
2020 diesel, 1974 (Good)	4000*
2020 diesel, 1973 (Good)	3775
2020 diesel, 1973 (Good)	4200
2010 diesel, 1965 (Good)	1300*
2010, ldr., 1961 (Fair)	1200
850 diesel, 1979 (Good)	4100
420, 1957 (Good)	1400*
420, 1956 (Good)	1375
420, 1956 (Fair)	950
401C diesel, 1975 (Excellent)	6100
40, 1953 (Good)	925

LEYLAND TRACTOR

384 diesel, 1971 (Rough)	1050

MASSEY-HARRIS TRACTORS

50, 1956 (Good)	1600
44, 1951 (Fair)	400*

OLIVER TRACTORS

1755 diesel, 1972, (Good)	5300
1655 diesel, 1971 (Good)	3725
1600 diesel, 1963 (Rough)	875
550 diesel, 1958 (Rough)	725
550 diesel, 1958 (Good)	1800
55 diesel, 1955 (Fair)	525

NOTES
Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.
Prices reported are NOT averages.

Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

DEMONSTRATOR means—used for demonstrating only and in practically new condition.

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INDUSTRY MARKETERS MAKE 1981, 1982 FORECASTS

By Bill Fogarty

Makers of tractors and field equipment predict sharp rebounds in retail sales this year, but their understanding of inflation factors appears clouded. Agri-equipment companies are somewhat less enthusiastic.

■OVER THE past year, farm equipment marketers have come to pay more attention than ever before to the prime rate and to interest costs faced by farmers. One thing they've learned:

For the prime rate not to be a deterrent to agricultural equipment sales, it will have to be around 12 or 13 per cent, or lower. This is the consensus opinion held by participants in the Farm & Industrial Equipment Institute's State-of-the-Industry survey, as delivered Jan. 30 at FIEI's Marketing & Management Conference at Miami Beach, Fla.

However, the marketers feel that the prime rate will go down to 13 per cent in August.

FORECASTING 1981, 1982
(Retail sales of units, United States)

			1981		1982	
Product	1979 Actual	1980 Actual	Fore-cast	Pct. change	Fore-cast	Pct. change
Tractors						
Under 40 HP	49,297	46,742	47,000	+ 0.6	49,500	+ 5.3
40-99 HP	65,002	58,191	61,500	+ 5.7	65,000	+ 5.7
100 HP and over	62,535	50,332	59,000	+17.2	60,107	+ 1.9
Four-Wheel Drive	11,455	10,886	11,[illegible]00	+ 6.6	12,075	+ 4.1
Total	188,289	166,151	179,000	+ 7.7	183,500	+ 2.5
S-P Combines	32,246	25,722	29,500	+14.7	30,700	+ 4.1
Cornheads	22,374	17,785	19,400	+ 9.1	20,750	+ 7.0
Field Cultivators	16,951	14,500	16,775	+15.7	17,750	+ 5.8
Chisel Plows	15,345	14,000	15,250	+ 8.9	16,050	+ 5.2
Disk Harrows	63,185	51,800	57,500	+11.0	61,000	+ 6.1
Moldboard Plows	31,743	24,000	25,500	+ 5.3	26,100	+ 2.4
Conventional Balers	18,750	14,005	14,750	+ 5.3	15,000	+ 1.7
Big Balers	21,351	16,453	19,000	+15.5	20,400	+ 7.4
Mower-Conditioners	25,600	19,449	21,050	+ 8.2	23,250	+10.5
Forage Harvesters	12,451	9,453	10,650	+12.7	11,350	+ 6.6
Windrowers/Swathers	8,918	7,100	8,140	+14.6	8,500	+ 4.4
Cotton Strippers	1,774	1,650	1,950	+18.2	1,950	0.0
Manure Spreaders	19,103	14,000	17,000	+21.4	18,500	+ 8.8
Grinder-Mixers	11,673	8,500	9,000	+ 5.9	10,000	+11.1

Source: Farm & Industrial Equipment Institute

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They also feel that net farm income will be $28.5 billion to $29.5 billion in 1981 and $32 billion in 1982. They expect gross receipts from farming to go up 14.9 per cent this year and 6.2 per cent in 1982.

Dollar volume

Both the Farm Equipment and the Agri-Equipment Divisions of FIEI median forecasts were for total dollar value of farm equipment retail sales to go up 10 per cent this year from 1980.

According to Cecil J. Stralow, marketing vice-president of Avco New Idea, who delivered the report, this is "just enough to cover inflation." He added that, "The overall unit sales forecast suggests this estimate could be accurate within 3 to 5 per cent, considering the forecast for inflation in 1981." (See I&T comment beside this article.)

Among the principal reasons given by FIEI members for expecting a rise in dollar sales volume were: Inflation, higher farm income, softening of interest rates late in 1981, end of the grain embargo to the U.S.S.R., greater export demand, more total cash receipts, and a new administration in Washington. Detriments cited by respondents who predicted a decline were: High interest rates, drought impact, limited loan funds in some areas and consumer confidence.

There were 50 participants in the survey from the Farm Equipment Div. (field machinery) and 32 from the Agri-Equipment Div. (farmstead-related lines). When they voted on dollar volume sales, the Farm Equipment group produced an opinion spread of from minus 17 to plus 23 per cent. Six of these firms saw dollar volume not changing from 1980 or declining; 21 expected sales to be up from 3 to 10 per cent; 23 others figure on a rise of anywhere from 11 to 23 per cent. Of the 32 Agri-Equipment participants, four predicted declines of from 2 to 30 per cent; 15 firms saw it running from 2 to 10 per cent higher; 13 others predicted a rise from 11 to 30 per cent.

Unit sales changes

Tractors. After posting sales of 166,151 wheel-type farm tractors in 1980, according to preliminary FIEI

(More...)

Some industrial-strength polish is needed on the crystal ball

The forecast that is put out each January by the FIEI's Marketing & Management Conference is one we always look forward to at I&T with an air of excitement. Obviously, it's one of the big recurring stories with the widest possible industry interest, for who isn't concerned about how good or bad the business is going to be during the next year?

There it is for everybody to see: Unit sales predictions on big tractors, four-wheelers, small tractors, big balers, field cultivators and many other important industry products. There are also some interesting sidelights, sometimes about ad budgets, sometimes about parts sales (both included this time) and there have been inventory discomfort indexes in the past.

Everybody reads these forecasts knowing that what happens in this business is thoroughly dependent on the level of farm prosperity, and that farm prosperity is influenced by many things that the handicappers cannot anticipate—drought, embargoes, harvest quantities among nations who are our customers or our competitors for farm product export sales, etc.

Obviously, these circumstances get in the way of delivering forecasts that turn out right on the button, so it is unfair to expect too much of the participants in this semi-annual exercise (they'll do it again in May).

However, it becomes apparent from a review of the State-of-the-Industry document that carries the consensus forecast that some of the participants are not giving the project the attention it deserves. If anyone doubts this, let him review some of the enormous "point spreads" that chronically develop in certain product areas year after year.

For example, there were 16 participants in the chisel plow forecast. Their estimates of unit sales for 1981 ran from a decline of 15 per cent to an increase of 42 per cent, with most of the predictions evenly spread from minus 10 to plus 18, with very little clustering. Can all these marketers be looking at the same market? Or are they only concerning themselves with what their individual firms are going to do? (They are expected to forecast on an industry-wide basis.)

If it can be argued that some companies in this group are too small to do a sophisticated market forecasting job, then take a look at self-propelled combines, where the spread is from plus 1 per cent to plus 21 per cent, fairly evenly spread. Combine firms are long and far removed from little-machine-shop status.

There is a lack of consistency on the part of a fair number of participants when it comes to dollar amounts and unit amounts. If the group really expects unit sales to be up 7.7 per cent on tractors, up 14 per cent on combines, and up by substantial amounts on every other product in the survey, then how can they see dollar sales rising by only 10 per cent? For both to happen would require an abrupt end to inflation-triggered price increases. Fat chance.

The group also predicted 11 and 10 per cent dollar increases in parts sales and advertising expenditures. Are they saying that they'll sell fewer or no more parts than last year? Are they planning on buying fewer pages of ads as part of the "more aggressive ad programs" they're talking about? (One veteran of the advertising sales wars around I&T shot me down on that one. "Any time," he said, "that manufacturers are not talking about drastic cuts in the ad budget, it's good news!")

With all that said, let me add this: The FIEI State-of-the-Industry forecast is the only one in town, and we love it! We hope it will continue forever, that it will grow in scope and that every one of its participants will work harder to refine his skill at estimating the market.—Bill Fogarty, Editor.

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AGRI-EQUIPMENT FORECASTS, 1981, 1982

(Per cent change, retail dollar volume)

	1981	1982
Portable Augers, Elevators	+ 5.0	+ 11.0
Bin-Type Crop Dryers	+ 2.0	+ 5.0
Batch, Continuous-Flow Dryers	+ 5.5	+ 10.0
Farmstead Equipment, Dairy/Beef	+ 5.0	+ 10.0
Farmstead Equipment, Hogs	+ 10.0	+ 10.0
Grain Bins	+ 3.5	+ 10.0
Milking Machines	+ 6.0	+ 6.5

Source: Farm & Industrial Equipment Institute.

Sales Forecasts *(continued)*

data, the industry's marketers are expecting to sell 7.7 per cent more units this year—179,000. The brightest estimate among eight respondents (presumably those eight companies that had products for sale in all four major size segments) was for a 12 per cent improvement; the most pessimistic was for a 2 per cent increase.

This group also peered at 1982 on this and other product groups. The outlook was for another improvement—2.5 per cent to 183,500 units. The "point spread" on that one was from minus two to plus 13 per cent.

Within the tractor group, little change is expected this year in unit sales of under-40-horsepower tractors (almost all made in Japan), going from last year's 46,742 up 0.6 per cent to 47,000 units. The 1982 outlook goes up 5.3 per cent to 49,500.

For tractors of from 40-99 horsepower, 1981 and 1982 are expected to see identical increases of 5.7 per cent—to 61,500 and then to 65,000 units. A sharp rebound is expected this year for the 100-hp-plus group, going up 17.2 per cent from last year's 50,332 units to 59,000 this year and another 1.9 per cent next year to 60,100. Four-wheelers are expected to rise 6.6 per cent to 11,600 units this year and another 4.1 per cent next year to 12,075.

Combines, cornheads. Sales of self-propelled combines fell over 20 per cent last year from 1979's 32,246 units to 25,722. As recently as last May, the consensus forecast had been for a decline of only 2,000 units, so inventory pressures are probably rather severe right now for this high-ticket product group. The group looks for a 1981 rebound to 29,500 units, up 14.7 per cent, and

Cecil J. Stralow, vice-president, Avco New Idea, delivered the report on the consensus outlook at the Marketing & Management Conference held by the FIEI Jan. 30-31 at Miami Beach, Fla.

(Continued on page 28)

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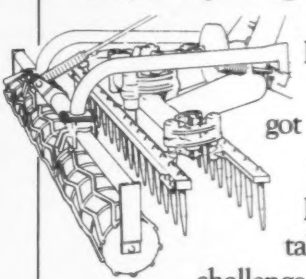

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Dealership Wages and Salaries: Summing Up Three Surveys

By Jack Root

I&T reviews association and university studies of employee incomes from dealerships in Virginia, West Virginia, Ohio, Arizona, Nevada and California.

What Farm Equipment Dealers Pay Their Employees

	Far West	Ohio*	W. Va. & Virginia**
Number of dealers:	72	116	65
Type of business:			
Most agricultural	57	[illegible]	51
Most industrial	12	[illegible]	9
Ag and industrial	3	[illegible]	4
Other	—	—	1
Sales Volume:			
Under $1 million	8	33	29
$1M to $2M	17	39	24
$2M to $3M	11	23	8
$3M to $5M	20	13	2
Over $5M	16	8	—
Monthly Salary rates:			
Sales manager	$2,200	—	$1,385
Service manager	$1,830	$6.62 hr.	$1,048
Parts manager	$1,650	$6.40 hr.	$ 970
Office manager	$1,600	—	$ 922
Bookkeeper	$1,000	$4.70 hr.	$ 3.94 hr.
Hourly Wage rates:			
Top mechanic	$8.88	$6.29	$5.44
Regular mechanic	$7.14	$5.27	$4.33
Truck driver	$7.16	$5.22	$3.76
Partsman	$6.91	$5.01	$3.92
Salesman's compensation:			
Straight commission	—	$19,100	NA
Salary only	$21,000	$19,700	NA
Salary and comm	$25,000	$16,400	NA
Customer rates:			
Shop	$24.25	—	$13.00
Welding	$26.50	$17.67 avg.	$15.30
Field	$26.13	—	$13.60

* *Agricultural dealers only, FWEDA and Virginia statistics are for all dealers.*
** *1978 data*

■SERVICE managers and shop workers from three western states are paid more than their counterparts in two other geographic areas, according to recent wage and salary surveys conducted by or for dealership associations.

Data shown in the accompanying chart are results from 1980 surveys for the California, Arizona and Nevada dealerships that comprise the Far West Equipment Dealers Assn. (FWEDA), and dealer members of the Ohio Farm & Power Retailers Assn. The figures for Virginia and West Virginia dealers are based on 1978 data and are part of a 1979 report by ag economists from Virginia Polytechnic Institute and State U.

Reporting procedures differed for the three surveys. The data for Ohio dealerships shown in the table are for *agricultural dealers* only. The other two surveys combined the wage and a salary data for *all categories* of dealers.

Comparative data from previous years were available only in the FWEDA report. It showed that service managers of the 72 reporting dealers eked out only a *$30 a month increase* over the previous year. In that survey of 48 dealers, the service manager's salaries recorded a 17 per cent increase. This puts the service managers salaries 1.5 per cent ahead of last year, but $370 a month behind what the average dealership sales manager receives.

Salesmen's earnings

FWEDA member salesmen working on salary only averaged $21,000 a year, while those working on a salary (base of $9,000) and commission earned $25,000. The Ohio report showed the average annual compensation for all of the 102 salesmen in the sample was $18,098. No data were available

(More...)

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Wage-Salary Surveys

(continued)

from the Virginia report.

Shop wages

In the five geographical areas of the Far West group, average hourly rates (median values) were up slightly from last year's report on four shop jobs—top mechanic, regular mechanic, truck driver and partsman. They were also ahead of figures reported for Ohio and the Virginias.

The reports show hourly workers in the Far West study averaged 40 hours a week, while those in Ohio and the Virginias worked an average of 40- to 50-hours per week. Salaried employees worked 50-plus hours a week in the far west, 44.5 hours in Ohio and 45-50 hours in the Virginias.

Customer rates

Customer rates ranged from $24.25 to $26.30 per hour for shop, welding and field work among FWEDA dealers. The average rate for the three types of customer services in Ohio was $17.67 per hour, and Virginia dealers' rates ranged from $13 to $15.30 per hour.

Western dealers were more liberal with vacation time. The majority allowed two weeks vacation after one year. Most of the other association's dealers offered only one week's vacation after a year's employment. Western dealers also allowed seven paid holidays with one-third of them granting eight or more holidays a year. No data on holiday policies were available from the other association reports.

Other benefits

Other employee benefits included profit-sharing, offered to half of the employees in the west and by 30 per cent of the dealers in the Virginias; pension plans offered to one-third of the employees of far west dealers and by 21 per cent of Virginia dealers to their employees.

Life insurance was part of the benefit package reported by 72 per cent of Ohio dealers and 85 per cent of Virginia dealers. Hospital insurance was provided to 93 per cent of the reporting Ohio dealers and 97 per cent of dealers in the Virginias. No data were available from the FWEDA report. □

Sales Forecasts

(Continued from page 20)

for a further 4.1 per cent rise in 1982 to 30,700.

Cornhead sales were also down sharply in 1980 but are anticipated to rise 9.1 per cent this year to 19,400 units and another 7 per cent next year to 20,750.

Other items. The industry marketers have a very upbeat approach to 1981 unit sales on every other piece of field equipment they included in the forecast. Even moldboards and conventional balers are up modestly, while field cultivators, big balers and forage harvesters are expected to show dramatic sales increases.

Agri-Equipment. This product group's members do their forecasting in terms of *per cent of change in retail dollar volume.* Unit numbers are not discussed.

In view of this, they appear to have a generally negative outlook on 1981 sales prospects, unless they are disregarding inflation and making no price increases from 1980 levels. For 1981, only hog-related farmstead equipment is expected to keep pace with a 10 per cent dollar sales rise. Other products are expected to post very modest dollar gains—from bin-type crop dryers (up 2 per cent) to milking machines (up 6 per cent).

Lawn and garden lines. This product group is expected to show a retail dollar volume increase of 5 per cent, a median figure derived from a very broad spread—from minus 18 to plus 20 per cent.

Parts sales

When times are tough, the industry looks to the parts operations of its member companies as a source of support, since delayed purchases of new equipment imply that owners will be spending more on replacement parts to keep their present machinery going.

Thus, a new feature in the FIEI survey is of particular interest—Farm Tractor and Equipment Retail Parts Sales. Dollar volume is expected to be up 11 per cent, according to the consensus estimate.

There were 38 participants in the question about parts sales. One of them predicted a 9 per cent decline in volume but all others saw increases in store. Most of these ran from 5 per cent to 24 per cent. But one has to wonder what vision passed before the eyes of the industry marketer who predicted a 120 per cent increase in parts dollar volume.

Alternate fuels

A recent survey by the FIEI to all land-grant colleges revealed that in 1980 there were probably less than 1,000 tractors and other mobile equipment (excluding cars and trucks) fueled by alcohol, gasohol or diesohol. By 1986, FIEI members think the number of farms using some alternative fuel in engine-driven farm equipment will increase 10 per cent. The wide range of responses (from plus 0.9 to 75 per cent) indicates that the rate of increasing use of such fuels is unknown.

Generally, says the report, equipment manufacturers believe this idea is consistent with the self-sufficient nature of American farmers and will be more significant in the future.

Ads, exports

FIEI members indicated that their outlays of advertising dollars would be up a median 10 per cent in 1981. Members predicting an increase gave these reasons, according to the Stralow report:

- **More aggressive** advertising programs needed for the 1981 marketplace.
- **Inflation**—increased rates.
- **Increase** of marketing area.

Generally, FIEI members perceive 1981 as a "difficult year requiring extra effort."

Over 85 per cent of respondents feel that United States exports of farm equipment will increase in the next three to five years. Of the other, 6.4 per cent said they expect declining sales and 8.5 per cent indicated they anticipate no change.

The most favored areas as export sales prospects by farm equipment manufacturers were ranked thus:

South America—39.5 per cent; Asia/Pacific—34.9 per cent; Canada—11 per cent; Western Europe—7 per cent; Africa—4.7 per cent; Eastern Europe—2.3 per cent. □

Here's more about the TRACTOR CENSUS

By Bill Fogarty

■IN I&T's Market Statistics Issue last Nov. 7, we printed a table containing data from 36 states disclosing the tractors-on-farms totals developed by the U.S. Census of Agriculture in 1978 vs. 1974. At the time, we promised we would publish the full 50-state table when all the numbers were in. Here it is.

The Census Bureau announced last fall that "significant improvements in data collection procedures" were used in the 1978 Census of Agriculture that had not been available in 1974, the year of the previous count.

With all the numbers in, we find an increase of over one-half million tractors on U.S. farms, whether you consider the "All Farms" category or the columns involved only with tractors on farms which had 1978 sales of farm products of $2,500 or more.

If we accept the revised approach of the government's enumerators as a better reflection of actual tractor population (and we know of no reason not to do so), then we can contemplate the presence of 4.85 million tractors on all farms—12.5 per cent more than the 1974 count—and 4.23 million on farms with sales of $2,500—a hike of 14.5 per cent. Previously, in 1964, the Agriculture Census had counted a peak of 4.78 million tractors. Numbers had been declining since then.

Examining the states

A brief scanning of the totals in the accompanying table tells us that the major increases in the count came in states east of the Mississippi. Pennsylvania's total went up 20 per cent to 143,000 units; among Kentucky's farms with sales of over $2,500, the total rose from 98,198 tractors to 140,903—a 43 per cent hike.

By way of contrast, the totals in

Preliminary report: NUMBERS OF TRACTORS ON FARMS, 1978 FARM CENSUS —SOME IMPORTANT CHANGES

State	All Farms		Farms With Sales of $2,500 or More	
	Ag Census 1978	Ag Census 1974	Ag Census 1978	Ag Census 1974
Alabama	75,519	66,586	54,767	43,827
Alaska	520	396	375	305
Arizona	12,846	12,214	10,828	10,727
Arkansas	89,633	75,825	74,037	59,438
California	136,640	112,822	118,510	99,331
Colorado	60,718	55,286	54,228	50,158
Connecticut	9,251	7,405	6,831	6,165
Delaware	8,743	7,485	8,138	6,952
Florida	57,172	42,125	44,394	32,355
Georgia	86,690	74,758	67,507	58,154
Hawaii	3,008	2,130	2,532	1,910
Idaho	55,759	49,689	50,781	45,068
Illinois	286,861	267,761	270,626	253,637
Indiana	183,227	164,535	164,108	147,163
Iowa	328,275	313,920	318,269	304,124
Kansas	160,700	158,607	150,051	147,090
Kentucky	165,011	126,357	140,903	98,198
Louisiana	64,564	54,536	49,923	41,662
Maine	15,084	12,508	11,268	10,392
Maryland	41,407	33,837	35,756	28,791
Massachusetts	10,974	8,630	8,523	7,012
Michigan	157,886	139,883	129,975	116,604
Minnesota	283,075	255,791	260,672	238,134
Mississippi	81,453	74,694	60,814	51,969
Missouri	205,224	185,123	182,533	151,015
Montana	56,042	53,914	52,291	50,314
Nebraska	177,872	168,085	172,853	162,197
Nevada	5,428	4,895	4,730	4,291
New Hampshire	5,665	4,616	3,895	3,420
New Jersey	23,249	18,579	19,411	16,055
New Mexico	17,585	16,369	13,733	12,954
New York	128,374	112,120	107,737	95,375
North Carolina	153,464	127,827	128,694	102,259
North Dakota	122,350	120,360	119,205	117,530
Ohio	206,624	184,634	178,978	157,769
Oklahoma	106,142	89,579	90,349	73,032
Oregon	52,575	44,340	41,472	34,840
Pennsylvania	143,039	119,223	119,259	94,929
Rhode Island	1,748	1,285	1,261	1,025
South Carolina	53,655	44,236	39,874	33,039
South Dakota	113,005	113,241	109,439	109,500
Tennessee	129,424	107,936	99,406	70,208
Texas	281,189	246,081	227,257	181,474
Utah	22,345	20,054	18,461	16,036
Vermont	16,396	13,694	13,551	12,104
Virginia	90,200	73,847	72,107	55,188
Washington	58,454	49,433	47,917	40,983
West Virginia	28,021	22,112	16,361	10,366
Wisconsin	258,751	232,965	238,101	212,214
Wyoming	19,830	19,490	18,393	18,157
TOTALS	4,850,667	4,311,822	4,231,084	3,695,440

Source: 1978 Census of Agriculture, Preliminary State Reports.

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North and South Dakota, for example, were almost unchanged, moving only from 233,600 to 235,585 tractors. The percentage shift in Iowa was not much—4.5 per cent upward—but Iowa is the most tractor-populous state in the union at 328,275, so we're talking about an extra 15,000 units.

The geographical differences suggest that the "hidden" tractors that have been unearthed are for the most part older and smaller, residing on smaller farms. There are comparatively few small holdings in the western states, where tractors tend to be bought in the higher horsepower brackets.

In the southern and eastern states, however, the incidence of "sundown farming" is generally regarded as being a much more common activity. Many such operations could not exist if it were not for the availability of small, simple, serviceable used tractors, often 25 years old or more. And the trade in these tractors, their parts and attachments has provided a solid segment for many farm equipment dealers, distributors, shortline manufacturers and, indirectly, for major manufacturers.

Questions

The new data produced by the Census of Agriculture raise some new questions that are particularly important to suppliers of such things as belts, hoses, tires, lubricants, filters, etc. If there are more tractors, are there more hours of tractor use than had been supposed? How much motor fuel is used in farming in a county or state can be determined from checking the amount of rebates to farmers on state fuel taxes. Could this information, plus county data from the Ag Census about tractors on farms tell us more about hours of use per year?

Another question arises: How effectively do the marketers of motor supplies and replacement parts promote their wares in those states with the newly discovered additions to tractor population?

How many of these additional tractors are gasoline-fueled? Would this have an effect on how many farmers would be interested in farm-produced alcohol as an alternate fuel? Or on how readily entrepreneurs might try to develop stills and still-related products for them? ☐

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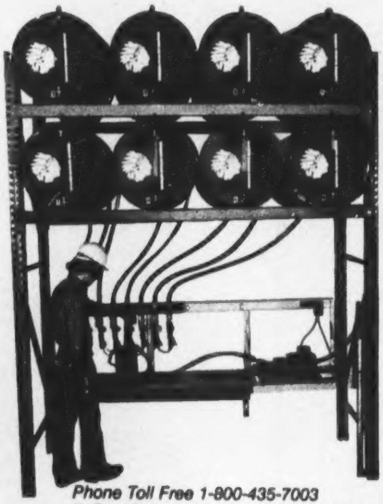

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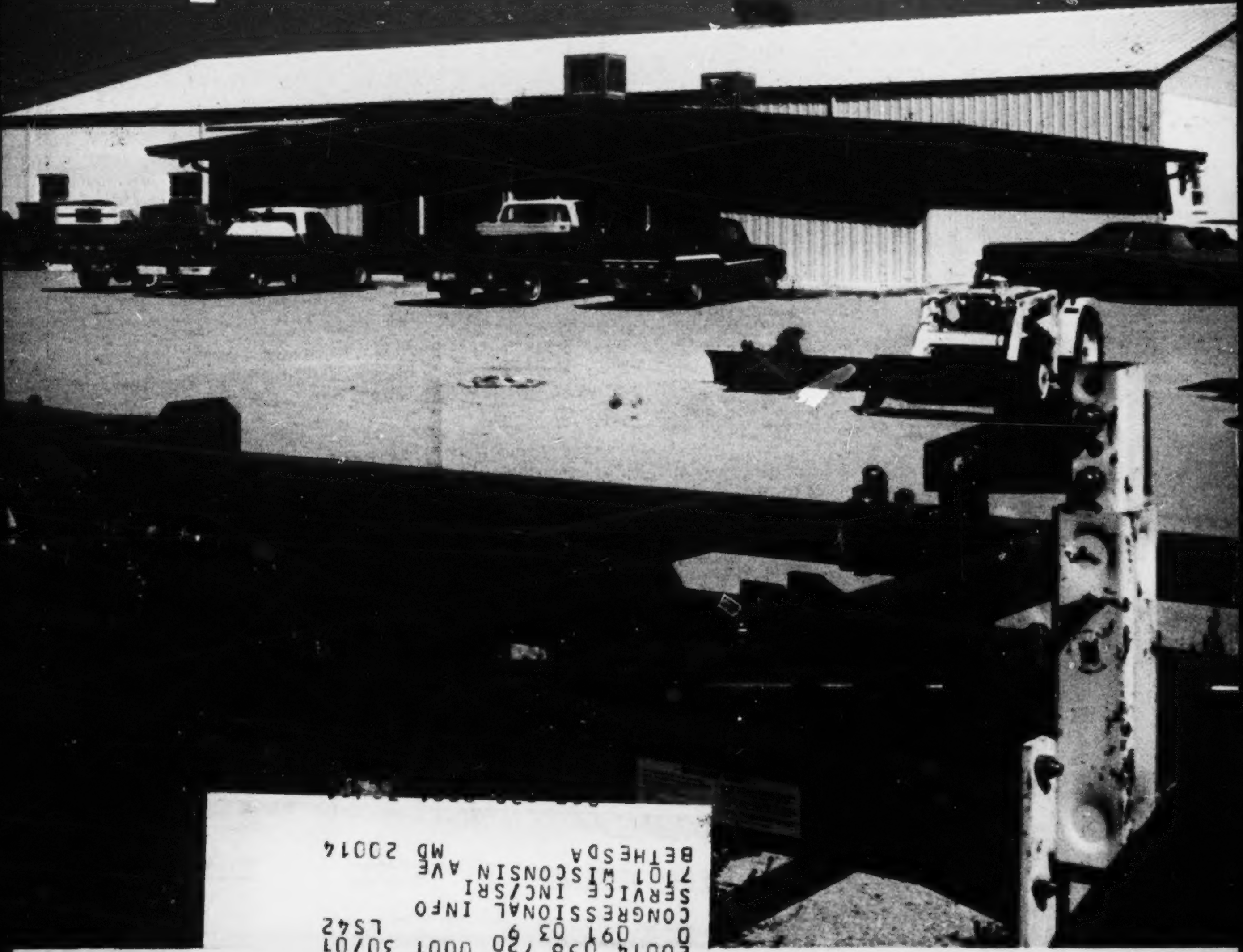

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FINDING AN ALTERNATIVE TO CONSTRUCTION

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In the I&T Manufacturers Edition
The human factor in equipment design
Part II—Controls

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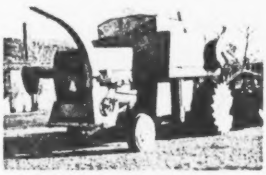
March 7, 1981 • Vol. 96 • No. 6

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

8: Is There A Cob Saver In Your Future? Purdue U. engineers modified a straw chopper to harvest corn cobs, which can be used instead of LP-gas to fuel grain dryers.



14: Looking Ahead. Participants in FIEI's Marketing & Management conference attempted to project conditions during the next four years, but with mixed results.

16: Danes Eye North American Markets. Danish manufacturers of farm equipment and government officials fete U.S. and Canadian wholesalers at Agromek '81 international trade fair, as they explore new markets for their products.

24: Need More Room? Rather than build new facilities, Homer Wickham let realtors find him a site to consolidate operations from several scattered locations. A vacant concrete pipe factory with 13 acres fit his needs with only a few alterations.

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what's ahead...

I&T
SINCE 1886

March 7, 1981

U.S. RETAIL SALES OF FARM EQUIPMENT IN JANUARY, according to the Farm & Industrial Equipment Institute's flash report, presented a depressingly familiar profile. Sales of all product groups in the report except self-propelled combines were down from the same period in 1980.

	Unit Retail Sales--January		
Equipment	1981	1980	Pct. Change
Farm Wheel Tractors			
2-wheel drive			
40-100 hp	3,945	4,586	-14.0
Over 100 hp	3,179	4,597	-30.8
Total 2-wheel dr.	7,124	9,183	-22.4
4-wheel drive	830	907	- 8.5
Total tractors	7,954	10,090	-21.2
Combines (S-P)	1,675	1,453	+15.3
Balers*	432	433	- 0.2
Forage Harvesters**	274	359	-23.7
Mower Conditioners	634	658	- 3.6

*Bales under 200 lbs. **Shear-bar type.

AUSTRALIAN SALES OUTLOOK: The Tractor & Machinery Assn. of Australia has issued its State-of-the-Industry report in which it anticipates 1981 tractor sales of approximately 13,850 and a 1982 volume of 14,200 units following 1980 sales of 13,915. Major anticipated growth is in high-horsepower sizes (100 and over). They predict self-propelled combine sales of 1,400 this year and next after 1,220 in 1980 and 1,741 in 1979. Pull-type combines, which had unit volumes of 540 and 545 in 1979 and 1980, are expected to improve to 630 in 1981 and 660 in 1982.

A world leader in the development of pneumatic seeders (I&T roundup, Nov. 21, 1980), Australia reports sales of 700 such units in 1979 and 960 in 1980 and predicts sales will be 840 in 1981 and 970 in 1982. By way of comparison, 2,407 drills were sold in 1979, 2,455 were sold in 1980, and volume is expected to ease off to 2,300 in 1981 and 2,210 in 1982.

WORLD CROP PRODUCTION ESTIMATES, as provided by USDA Foreign Agricultural Service: Grain output for 1980-81 forecast at 1.542 billion metric tons, including 270 million tons in the U.S., compared with 1.536 billion and 303 million for 1979-80. Oilseed output for the world is forecast at 160 million metric tons in 1980-81 (U.S. 56 million), compared with 174 million (U.S. 72 million) metric tons in 1979-80. Cotton production is estimated at 64 million bales (U.S. 11 million) in 1980-81 compared with 1979-80's 66 million bales (U.S. 14.6 million bales).

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RETAIL SALES OF WHEEL TRACTORS*

(In Units)

	Total Wheel Tractors†				Cumulative for Jan.-Nov., 1979				Cumulative for Jan.-Nov., 1980			
	Nov., 1979		Nov., 1980		Farm Type				Farm Type			
	Farm	Non-Farm	Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm
Alabama	94	27	107	19	2,531	41	2,572	600	2,052	62	2,114	365
Alaska	.....	2	.....	5	19	1	20	38	24	6	30	42
Arizona	26	44	62	20	615	106	721	645	787	93	880	438
Arkansas	171	33	162	34	3,489	264	3,753	661	2,840	326	3,166	500
California	287	266	369	138	4,321	360	4,681	3,615	4,084	401	4,485	2,519
Colorado	20	49	63	14	964	167	1,131	693	1,043	204	1,247	569
Connecticut	17	16	14	21	180	2	182	260	220	6	226	206
Delaware	8	6	7	1	211	19	230	53	135	9	144	36
Florida	83	105	165	64	2,073	84	2,157	1,642	2,356	108	2,464	1,089
Georgia	127	46	154	33	3,487	45	3,532	848	2,777	49	2,826	561
Hawaii	1	8	5	4	50	4	54	103	66	2	68	84
Idaho	62	13	155	9	995	166	1,161	198	1,153	178	1,331	135
Illinois	323	85	554	37	6,287	865	7,152	1,635	5,189	825	6,014	788
Indiana	233	46	374	21	3,939	508	4,447	866	3,082	470	3,552	437
Iowa	337	26	690	20	8,290	735	9,025	452	5,935	703	6,638	264
Kansas	171	28	346	15	3,898	594	4,492	384	3,389	710	4,099	305
Kentucky	124	27	213	19	4,148	101	4,249	779	3,580	75	3,655	465
Louisiana	119	63	238	34	2,353	181	2,534	850	2,536	243	2,779	579
Maine	6	5	10	3	215	2	217	133	231	3	234	86
Maryland	27	38	47	20	751	40	791	514	659	31	690	324
Massachusetts	12	24	4	14	138	.....	138	348	135	1	136	265
Michigan	116	78	311	20	2,656	258	2,914	1,434	2,410	302	2,712	729
Minnesota	361	21	484	18	5,742	922	6,664	699	4,243	717	4,960	353
Mississippi	170	21	314	21	3,179	156	3,335	572	3,079	242	3,321	376
Missouri	204	51	262	25	5,009	275	5,284	923	3,629	230	3,859	552
Montana	47	17	86	7	855	419	1,274	183	1,072	277	1,349	201
Nebraska	148	19	329	5	4,046	313	4,359	285	3,184	354	3,538	173
Nevada	4	15	1	4	119	9	128	215	104	11	115	115
New Hampshire	3	5	9	7	135	1	136	111	136	2	138	99
New Jersey	14	37	11	17	289	8	297	686	275	4	279	456
New Mexico	15	13	24	18	429	24	453	323	389	19	408	220
New York	169	64	172	55	2,543	124	2,667	1,108	2,347	99	2,446	850
North Carolina	139	37	272	34	3,733	74	3,807	870	3,286	51	3,337	596
North Dakota	131	13	235	16	2,289	1,071	3,360	237	1,578	802	2,380	143
Ohio	247	77	324	48	4,229	387	4,616	1,673	3,432	367	3,799	831
Oklahoma	119	34	200	25	3,212	430	3,642	723	2,520	353	2,873	579
Oregon	54	44	86	15	1,197	95	1,292	535	1,279	80	1,359	373
Pennsylvania	127	71	109	34	2,247	43	2,290	1,429	2,027	51	2,078	961
Rhode Island	2	.....	1	5	25	.....	25	40	16	.....	16	45
South Carolina	65	37	90	15	1,715	41	1,756	476	1,377	47	1,424	347
South Dakota	104	9	225	9	2,208	335	2,543	178	1,613	262	1,875	95
Tennessee	121	40	158	34	3,683	72	3,755	879	2,807	91	2,898	445
Texas	413	284	549	168	9,592	589	10,181	4,254	8,941	579	9,520	3,294
Utah	30	37	42	9	653	18	671	459	602	33	635	326
Vermont	14	3	12	.....	373	9	382	71	322	3	325	42
Virginia	101	51	113	15	2,372	18	2,390	698	2,026	25	2,051	506
Washington	83	44	123	30	1,545	190	1,735	824	1,772	185	1,957	447
West Virginia	10	29	21	14	564	.....	564	272	430	.....	430	187
Wisconsin	281	39	340	25	5,370	248	5,618	714	4,439	249	4,688	457
Wyoming	18	20	23	13	398	38	436	245	346	40	386	156
U.S. Government	9	13	.....	.....	139	.....	139	547	220	.....	220	590
Miscellaneous‡	.....	91	15	82	44	4	48	1,552	317	.....	317	578
TOTAL	**5,567**	**2,271**	**8,680**	**1,333**	**119,544**	**10,456**	**130,000**	**38,533**	**102,491**	**9,980**	**112,471**	**25,183**

Data released January 26, 1981, Farm & Industrial Equipment Institute.

*Figures do not include garden tractors, motor tillers or contractors off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland, Satoh); Allis-Chalmers; Belarus; J I Case; Deere; Deutz; Ford; International Harvester; Long; Massey-Ferguson; R. M. Wade (Satoh); Steiger; Versatile; and White.

†The monthly sales are those reported for that month only. The cumulative totals are subject to revisions reflecting updating in the basic sales data.

‡Sales reported as miscellaneous are retail sales that cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

RETAIL SALES OF SELECTED FARM EQUIPMENT—Jan.-Nov., 1979 and 1980(1)

(In Units)

	Combines Self-Propelled		Corn Heads		Hay Balers (2)		Windrowers Self-Propelled				Grinder-Mixers		Shear-Bar Forage Harvesters (3)	
							Power Units		Total Heads					
	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980
Alabama	478	235	102	61	248	147	1	2	1	1	213	116	59	34
Alaska	3	5	.....	.....	9	18	.....	3	.....	4	.....	1	.....	.....
Arizona	30	55	5	7	43	44	60	60	66	72	4	8	15	11
Arkansas	1,062	655	11	5	417	182	2	.....	1	.....	57	74	26	11
California	231	262	61	52	239	165	285	273	313	302	15	5	77	69
Colorado	299	326	152	147	498	429	279	211	286	228	37	62	182	97
Connecticut	2	.....	1	.....	65	54	.....	.....	.....	.....	2	1	66	40
Delaware	55	42	36	44	18	15	.....	1	.....	1	10	8	14	12
Florida	136	73	72	50	113	73	2	.....	2	.....	62	42	25	25
Georgia	724	365	503	293	240	186	1	1	1	1	493	248	130	104
Hawaii	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Idaho	357	410	11	19	492	591	354	391	365	401	41	55	70	74
Illinois	3,147	2,521	3,326	2,640	393	323	15	22	15	22	633	452	360	256
Indiana	1,865	1,402	1,968	1,503	414	310	12	8	12	8	566	349	256	181
Iowa	3,265	2,713	3,905	2,919	456	317	260	131	256	138	1,917	1,142	911	545
Kansas	1,717	1,716	388	331	492	301	403	274	415	284	331	226	340	259
Kentucky	547	339	384	265	454	282	3	3	4	3	312	284	225	173
Louisiana	632	422	1	3	159	65	.....	.....	.....	.....	13	19	21	19
Maine	2	7	.....	.....	88	70	3	2	3	2	1	1	63	43
Maryland	148	141	161	159	133	116	8	13	7	14	46	36	117	76
Massachusetts	.....	.....	.....	.....	57	49	1	6	.....	6	1	3	36	37
Michigan	569	544	528	523	478	373	81	63	85	64	250	232	507	410
Minnesota	1,925	1,556	1,815	1,368	952	713	754	626	777	644	862	547	1,172	833
Mississippi	857	515	9	6	205	77	.....	2	.....	1	61	43	74	60
Missouri	1,567	981	893	481	675	420	88	83	90	90	617	465	213	183
Montana	376	399	5	6	402	384	493	424	531	473	70	63	46	36
Nebraska	1,708	1,444	1,693	1,351	252	204	503	289	510	303	577	456	476	354
Nevada	3	3	.....	.....	54	38	74	57	77	62	1	2	6	8
New Hampshire	.....	.....	.....	.....	59	57	1	.....	1	.....	2	.....	37	34
New Jersey	45	26	15	18	65	38	.....	.....	.....	.....	13	7	31	16
New Mexico	30	38	12	15	168	127	98	63	98	66	18	12	11	7
New York	151	168	260	217	799	747	73	67	73	68	122	110	1,028	814
North Carolina	627	386	505	375	319	289	3	2	3	2	242	154	132	90
North Dakota	1,310	945	68	57	94	55	914	562	980	609	178	131	148	143
Ohio	1,557	1,124	1,462	1,046	691	511	14	9	14	9	504	365	377	257
Oklahoma	572	547	12	22	894	396	164	99	169	107	151	116	60	34
Oregon	206	224	13	8	323	403	251	259	253	282	35	29	83	49
Pennsylvania	258	184	280	269	953	727	89	50	90	53	318	283	757	519
Rhode Island	.....	.....	.....	.....	6	7	.....	7	.....	6	1	.....	1	1
South Carolina	360	200	185	123	101	79	.....	.....	.....	.....	125	64	37	36
South Dakota	676	489	497	276	179	94	776	510	837	553	383	287	481	386
Tennessee	655	358	214	151	600	379	1	1	1	1	261	187	221	143
Texas	930	929	274	293	1,417	717	118	84	129	89	237	225	84	81
Utah	40	38	15	10	320	332	148	129	150	141	71	29	95	98
Vermont	.....	1	.....	1	132	108	1	4	1	4	2	.....	175	153
Virginia	234	115	203	120	477	383	7	7	7	7	147	90	248	197
Washington	367	426	71	33	342	431	208	188	219	191	20	19	101	142
West Virginia	3	5	6	5	260	157	.....	1	.....	1	32	26	53	27
Wisconsin	541	648	665	769	1,948	1,433	386	381	392	390	593	492	2,335	1,896
Wyoming	49	53	15	14	208	192	193	195	203	211	24	22	49	42
U.S. Government	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous (4)	.....	.....	.....	6	.....	.....	.....	.....	.....	.....	6	.....	.....	.....
TOTAL	**30,317**	**24,035**	**20,802**	**16,062**	**18,401**	**13,608**	**7,129**	**5,563**	**7,437**	**5,914**	**10,707**	**7,588**	**12,031**	**9,117**

Data released January 26, 1981, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled.
(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

Mower Conditioners All Types		Manure Spreaders Conveyor-Type		
1979	1980	1979	1980	
236	140	18	18	Alabama
2	8	1	1	Alaska
6	9	9	6	Arizona
570	357	108	82	Arkansas
48	44	78	61	California
164	157	66	57	Colorado
90	94	78	62	Connecticut
18	18	68	55	Delaware
119	83	29	29	Florida
272	223	47	45	Georgia
1	.....	2	1	Hawaii
119	162	122	120	Idaho
755	591	878	552	Illinois
691	499	686	463	Indiana
,450	1,049	2,271	1,253	Iowa
981	599	252	187	Kansas
,186	787	294	248	Kentucky
121	46	24	26	Louisiana
120	116	114	106	Maine
175	112	223	202	Maryland
81	51	72	68	Massachusetts
767	667	767	678	Michigan
,437	1,023	1,832	1,360	Minnesota
195	101	31	19	Mississippi
,750	1,145	422	302	Missouri
121	149	48	47	Montana
601	455	529	323	Nebraska
12	9	6	5	Nevada
69	71	51	55	New Hampshire
77	54	59	48	New Jersey
35	21	6	9	New Mexico
,245	1,129	1,479	1,337	New York
376	265	158	135	North Carolina
169	133	109	100	North Dakota
,086	771	976	767	Ohio
944	593	34	49	Oklahoma
193	275	114	104	Oregon
,213	905	1,311	1,118	Pennsylvania
6	4	1	.....	Rhode Island
139	76	31	26	South Carolina
146	83	348	200	South Dakota
925	556	175	151	Tennessee
,515	1,075	146	136	Texas
180	192	95	112	Utah
249	243	264	211	Vermont
746	656	241	216	Virginia
153	254	138	125	Washington
238	168	90	54	West Virginia
,101	2,436	2,826	2,032	Wisconsin
69	53	49	37	Wyoming
.....	.....	.....	.....	U.S. Government
.....	.....	1	2	Miscellaneous
,962	18,707	17,777	13,400	TOTAL

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AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

YODER & FREY, INC.
Archbold, Ohio
(February 9, 1981)

ALLIS-CHALMERS TRACTORS

7060 diesel, 1976 (Fair)	16,600
7030 diesel, 1975 (Good)	10,900*
7030 diesel, 1973 (Fair)	9900
XT190, 1967 (Good)	6750
XT190, 1965 (Fair)	4300
XT190, 1965 (Fair)	4000
180 diesel, 1970 (Fair)	4200
D17, ldr., 1964 (Fair)	2000*
D17, 1964 (Fair)	1950*

DAVID BROWN TRACTORS

1200 diesel, 1969 (Rough)	3450*
1200 diesel, 1961 (Rough)	2200
950, ldr., 1956 (Fair)	1100
885, 1969 (Fair)	2450*

CASE TRACTORS

2470 diesel, 1974 (Excellent)	12,700*
1270 diesel, 1973 (Good)	11,100*
1070 diesel, 1972 (Fair)	8600
1030 diesel, 1966 (Fair)	5450
1030 diesel, 1966 (Rough)	3800*
970 diesel, 1971 (Good)	5600*
930 diesel, 1968 (Good)	4175
830 diesel, 1958 (Good)	1650
830, 1956 (Fair)	1000

JOHN DEERE TRACTORS

5020 diesel, 1967 (Fair)	7800
5020 diesel, (Rough)	4300
4620 diesel, 1971 (Fair)	8800*
4520 diesel, (Good)	10,400*
4520 diesel, 1971 (Fair)	8200*
4430 diesel, 1974 (Excellent)	16,500
4430 diesel, 1974 (Good)	15,750
4430 diesel, 1973 (Good)	15,300*
4320 diesel, 1970 (Fair)	9650
4320 diesel, 1970 (Fair)	9500*
4320 diesel, 1970 (Fair)	8400*
4320 diesel, 1970 (Fair)	9300*
4320 diesel, 1970 (Good)	9200*
4230 diesel, 1974 (Good)	16,000
4020 diesel, 1970 (Fair)	8250
4020 diesel, 1969 (Fair)	7500*
4020, 1967 (Good)	4450
4020 diesel, 1965 (Good)	6500
4020, 1966 (Fair)	4000*
4020 diesel, 1965 (Fair)	6575*
4020, 1964 (Fair)	3000
4010 diesel, 1964 (Good)	5150
4010 diesel, 1961 (Fair)	5100*
4010 diesel, 1962 (Good)	5000
3020 diesel, 1966 (Good)	6950
3020, 1963 (Good)	2900
3020 diesel, (Rough)	2500
2520 diesel, 1969 (Fair)	5050
2010, 1964 (Fair)	1800
2010, 1964 (Fair)	1775
2010 diesel, 1963 (Good)	1800*
2010 diesel, 1962 (Rough)	1525
720 diesel, 1957 (Good)	2050
720, 1957 (Fair)	1350
630, 1957 (Good)	1975
620, 1956 (Fair)	1225
530, 1958 (Good)	1450*
520, 1957 (Good)	1750*
70, 1955 (Good)	1200*
50, 1953 (Fair)	725
50, 1953 (Fair)	725
A, 1950 (Good)	780
MT, 1948 (Fair)	650

FORD TRACTORS

5000, 1971 (Good)	4800*
4000, 1970 (Good)	3750*
4000, 1968 (Good)	3850
3600 diesel, 1980 (Excellent)	8400*
3600, 1980 (Excellent)	8200
3400, ldr., 1968 (Good)	2275
2000, ldr., 1959 (Good)	2400*
850, 1957 (Fair)	1625
801, ldr., 1957 (Fair)	1750
601, 1957 (Good)	2350
8N, ldr., 1951 (Good)	1370
8N, 1950 (Rough)	1050*
8N, 1950 (Rough)	1030
8N, 1948 (Fair)	1025
8N, 1948 (Fair)	975
8N, ldr., 1948 (Rough)	950
8N, 1948 (Fair)	900
8N, 1948 (Fair)	925*
8N, 1946 (Good)	900*
9N, 1945 (Good)	975

FERGUSON TRACTORS

TO35, 1954 (Fair)	1550
30, 1951 (Fair)	1400*

INTERNATIONAL HARVESTER TRACTORS

2656, 1973 (Good)	2450*
1586 diesel, 1978 (Excellent)	17,700*
1466 diesel, 1974 (Fair)	11,600
1466 diesel, 1972 (Good)	11,750*
1466 diesel, 1971 (Good)	10,650
1466 diesel, 1971 (Fair)	8500
1256 diesel, 1968 (Fair)	6000*
1206 diesel, 1965 (Fair)	6250*
1206 diesel, 1963 (Good)	6900
1066 diesel, 1973 (Fair)	11,300*
1066 diesel, 1974 (Fair)	11,500*
1066 diesel, 1974 (Fair)	11,250*
856, 1968 (Fair)	7700*
826 diesel, 1974 (Fair)	6600*
806 diesel, 1967 (Fair)	5100
806, 1967 (Fair)	4650*
806, 1966 (Rough)	2550
706, 1967 (Good)	3750
706, 1965 (Good)	3750
706 diesel, 1962 (Good)	4200*
706, 1962 (Good	2425
706, 1962 (Fair)	2050*
656 diesel, 1968 (Fair)	5050*
560 diesel, 1961 (Good)	2250
560, 1961 (Good)	1900*
544, ldr., 1972 (Fair)	3850*
450, (Fair)	1450
450 diesel, 1957 (Fair)	1150
444, 1969 (Good)	3000
434, 1964 (Fair)	2300*
404, mo., 1959 (Good)	1075
400, 1956 (Good)	1075
330, 1951 (Fair)	1100
300, 1954 (Fair)	875*
100 Hydro., 1971 (Fair)	10,400*
Sup. M, 1956 (Good)	1150
Sup. M, 1956 (Good)	1050
M, ldr., 1952 (Fair)	910
M, 1951 (Fair)	780
M, 1946 (Fair)	750
M, 1945 (Rough)	550
Sup. H, (Good)	925*
H, 1951 (Fair)	870
H, ldr., 1949 (Fair)	635
Sup. A, cult., 1952 (Fair)	1650*

MASSEY-FERGUSON TRACTORS

1150 diesel, 1967 (Rough)	6450
1135 diesel, 1974 (Fair)	7100*
1100 diesel, 1969 (Fair)	4050
1100, 1967 (Good)	3475
285, (Good)	9000*
165, ldr., 1964 (Fair)	2450
Sup. 90, 1960 (Fair)	1400
Sup. 90, 1958 (Fair)	1275
90 diesel, 1956 (Rough)	1450
50, 1958 (Good)	2025
35, 1952 (Good)	1775
30, 1965 (Fair)	2900*

MINNEAPOLIS-MOLINE TRACTORS

950 diesel, 1971 (Good)	4100*
670, 1961 (Good)	2950

OLIVER TRACTORS

1950 turbo, 1968 (Good)	6950
1855, 1968 (Good)	2550*
1855, 1967 (Good)	6350
1850 diesel, 1966 (Good)	4000
1850, 1965 (Fair)	3975
1800, 1961 (Fair)	3400
1850, 1959 (Fair)	1750
1650 diesel, 1967 (Fair)	2950
1650, 1963 (Fair)	2650
880, 1957 (Fair)	800*
880, 1956 (Fair)	1350
880 diesel, (Rough)	1050*

WHITE TRACTORS

2255, 1974 (Rough)	12,300*
4-180, 1975 (Good)	10,800
4-150, 1976 (Good)	15,400*
2-135, 1978 (Good)	15,000*

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page 10

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Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

5: **Editor's Notebook** is a new feature with Editor Bill Fogarty providing some behind-the-scenes insights to today's farm machinery industry and some follow-ups to recent articles that appeared in I&T.

10: **Israeli Portfolio.** A look at specialized machinery developed to handle the tillage requirements of Israel's hard, clod-forming soils.

14: **These Dealers Delegate Authority.** The owners of this Ford dealership delegate substantial authority to their department managers to free themselves for sales work. And, they are pleased with the results. On the cover are the owners, Mike Pozniak, left, and Tom Donohoe.

20: **Corn Field Wastes Take On New Glow:** Ag engineers develop furnaces and gasification techniques using corncobs and residue to fuel grain dryers and save petroleum fuels.

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what's ahead...

I&T
SINCE 1886

March 21, 1981

THE MARCH TOWARD REDUCED TILLAGE CONTINUES throughout U.S. agriculture. During the past 10 years, according to No-Till Farmer, the amount of no-tillage in the United States has gone up 260 per cent. For 1981, the publication estimates that no-tillage methods will be applied on 8.66 million acres (compared with 7.14 million in 1980) and that minimum-tillage methods will be used on 88.14 million acres (vs. 82.84 million last year). Conversely, conventional tillage practices will be followed on 206.5 million acres this year vs. 211.1 million in 1980. (Sources for No-Till Farmer data are state agronomists of the Soil Conservation Service.) In one state in which erosion has been of grave concern for many years--Iowa--minimum tillage methods are now applied on more acres (11.2 million) than are conventional methods (9.7 million acres). Complete crop-by-crop and state-by-state acreage breakdowns are available for $100 from No-Till Farmer, 733 Van Buren, Milwaukee, Wis. 53202.

HOW MANY FARMS WILL THERE BE IN THE YEAR 2000? Three USDA specialists, William Lin, George Coffman and J. B. Penn, in a document titled, "U.S. Farm Numbers, Sizes and Related Structural Dimensions," estimate that the total number of farms will decline from 2.9 million in 1974 to 2.1 million in 1990 and to 1.75 million in 2000 "if present trends continue." They predict a large proportion of small farms, an ever-increasing proportion of large farms and a declining proportion of medium-size farms. Large farms, with sales of over $100,000 yearly, will increase from 5 per cent to 32 per cent. Here's how their projections shape up:

Sales Class	1985	1990	2000
Less than $20,000	1,416,000	1,193,000	889,000
$20,000 to $99,999	563,000	450,000	301,000
$100,000 to $499,999	290,000	358,000	344,000
$500,000 and over	51,000	88,000	217,000
All farms	2,320,000	2,090,000	1,750,000

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AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

JONES FARM EQUIPMENT CO.
Dothan, Alabama
(February 10, 1981)

ALLIS-CHALMERS TRACTORS

5050 diesel, 1978 (Good)	3900*
5040 diesel, 1977 (Fair)	3000*
WD, 1951 (Good)	350

CASE TRACTORS

1370 diesel, cab, air, 1975 (Good)	15,000*
580 diesel, ldr., backhoe, 1970 (Good)	4500*

DEUTZ TRACTOR

8005 diesel, (Fair)	2800*

DAVID BROWN TRACTOR

990 diesel, (Good)	2100

MASSEY-FERGUSON TRACTORS

1130 diesel, 1970, (Good)	5150*
1130 diesel, 1968 (Good)	5000
1100 diesel, 1970 (Good)	5300
1085 diesel, 1976 (Good)	5600
245 diesel, 1977 (Excellent)	6450*
230 diesel, 1979 (Excellent)	5300
180 diesel, 1967 (Good)	3500*
175 diesel, 1972 (Good)	3800
175 diesel, 1971 (Fair)	2850
165 diesel, 1975 (Rough)	2000
165 diesel, 1974, (Good)	4000
165 diesel, 1968, (Good)	3850
165 diesel, 1967 (Fair)	3275*
165 diesel, 1967 (Fair)	3300
135 diesel, 1971 (Excellent)	3650
135 diesel, 1970 (Excellent)	3500
65 diesel, 1964 (Good)	1800*
65 diesel, 1962 (Good)	2300
65 diesel, 1962 (Good)	2200
65 diesel, 1961 (Good)	2200
65 diesel, 1961 (Good)	2000*
65 diesel, 1960 (Good)	2000*
50 diesel, 1964 (Excellent)	2550*
35 diesel, 1963 (Excellent)	2300*
35 diesel, 1963 (Excellent)	2300
35 diesel, 1962 (Good)	1900
35, ldr., 1961 (Good)	2150*
35, 1960 (Good)	2150*
TO30, 1952 (Good)	1200*
TO30, 1952 (Rough)	600
TO30, 1952 (Rough)	650

FORD TRACTORS

9600 diesel, 1975 (Good)	6150
7000 diesel, 1974 (Excellent)	6900
7000 diesel, 1974 (Good)	5500*
7000 diesel, 1974 (Excellent)	7000
5000 diesel, 1974 (Good)	6450
5000 diesel, 1972 (Excellent)	5900
5000 diesel, 1972 (Excellent)	5450*
5000 diesel, 1972 (Good)	4450
5000 diesel, 1966 (Rough)	1400*
5000 diesel, 1965 (Fair)	3100
4500 diesel, 1969 (Good)	3850
4000 diesel, 1972 (Good)	3900*
4000 diesel, 1972 (Good)	3800*
3400 diesel, 1974 (Good)	3900
3000 diesel, 1968 (Good)	3000
3000 diesel, 1966 (Fair)	2100
3000 diesel, 1966 (Good)	2600
2000, 1969 (Good)	3000
850, 1956 (Excellent)	2100
841, ldr., 1958 (Fair)	1325
640, 1956 (Excellent)	2125
621, 1959 (Good)	2200*
Maj. D, 1953 (Good)	650
Sup. Dexta, 1962 (Good)	1150
Dexta, 1959 (Good)	1050
8N, 1951 (Good)	1200
8N, 1951 (Good)	1000
8N, 1952 (Excellent)	1325
8N, 1952 (Excellent)	1550
8N, 1951 (Excellent)	1475*
8N, 1951 (Good)	1200*
8N, 1948 (Fair)	775*
8N, 1948 (Fair)	800

INTERNATIONAL HARVESTER TRACTORS

1566 diesel, 1975	9100*
1256 diesel, duals, 1968 (Fair)	4300*
1066 diesel, 1972 (Excellent)	7750
806 diesel, 1965 (Rough)	2650*
666 diesel, 1974 (Excellent)	6750
656 diesel, 1965 (Fair)	3000*
656 diesel, 1965 (Good)	3500*
574 diesel, 1977 (Excellent)	5250
574 diesel, 1973 (Good)	3500
574 diesel, 1972 (Excellent)	4200
B414 diesel, 1961 (Fair)	800
330, 1957 (Good)	1100
Sup. M, 1953 (Good)	700
M, 1942 (Fair)	340
Sup. A, cult., 1951 (Fair)	825
154 Cub Loboy, 1970 (Good)	1200
Cub, 1952 (Good)	1300
Cub, mo., 1950 (Good)	1000
Cub, cult., pit., 1948 (Fair)	725
Cub, mo., 1948 (Rough)	500

JOHN DEERE TRACTORS

4240 diesel, 1978 (Good)	15,100
4020 diesel, 1968 (Good)	6150
4020 diesel, 1966 (Fair)	3475
4010 diesel, 1963 (Excellent)	5350
3020 diesel, 1972 (Excellent)	5900
3020 diesel, 1967 (Good)	5100
3020 diesel, 1967 (Good)	4500*
3020 diesel, 1965 (Good)	4650
3010 diesel, 1961 (Good)	3300*
2840 diesel, 1977 (Excellent)	11,250
2030 diesel, 1973 (Excellent)	4500*
2020 diesel, 1968 (Good)	3750
2020 diesel, 1968 (Good)	3800
1020 diesel, 1966 (Good)	3250*

KUBOTA TRACTORS

85 diesel turbo, (Excellent)	4000*
L175, (Excellent)	3100
L175, (Excellent)	3000

LONG TRACTORS

560 diesel, (Good)	2400
560 diesel, (Good)	2400
445 diesel, 1976 (Good)	2450*
384 diesel, (Fair)	2000

OLIVER TRACTORS

1755 diesel, 1972 (Good)	5500*
550 diesel, 1958 (Rough)	725

NOTES

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.
Prices reported are NOT averages.

Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

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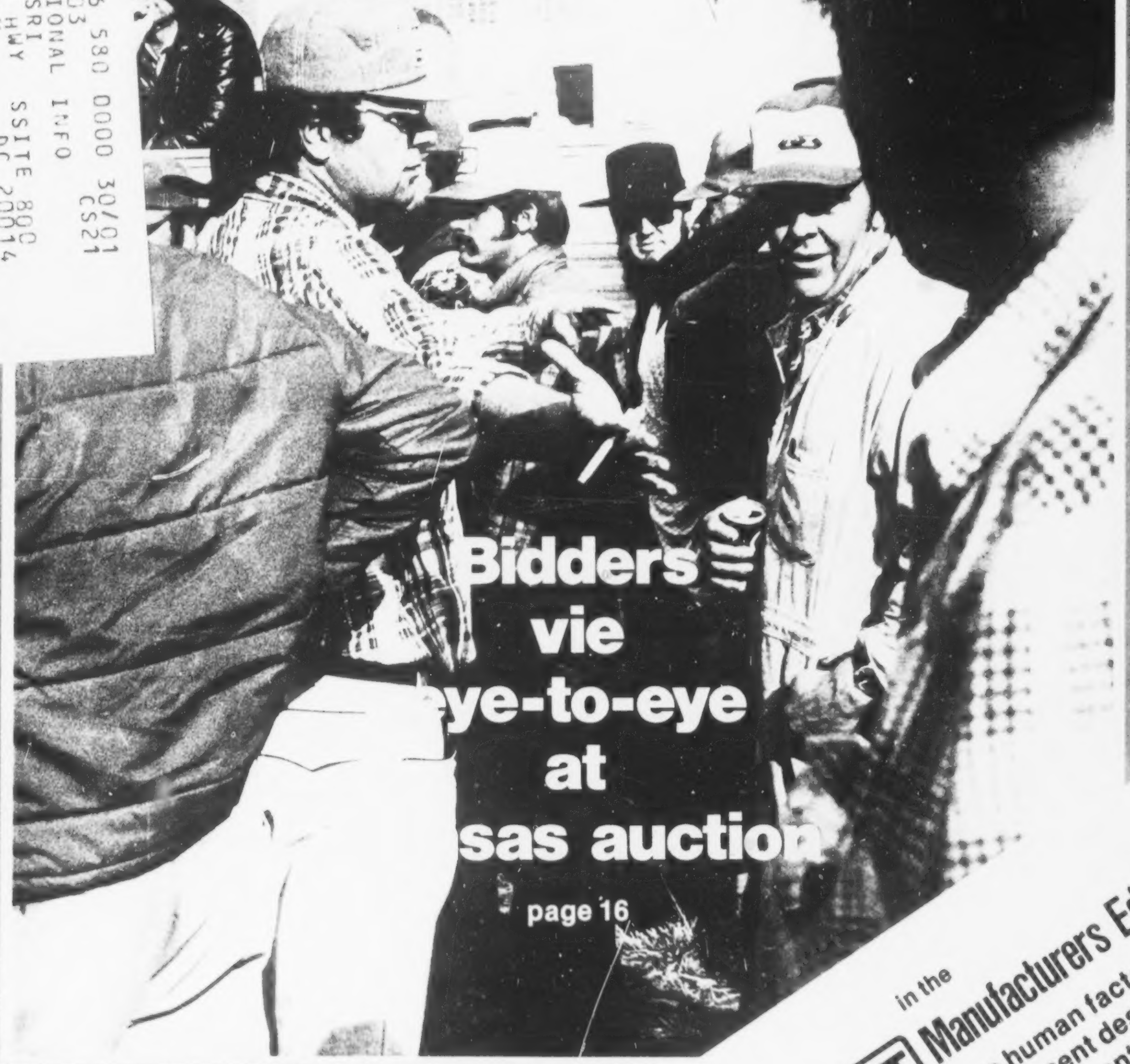

Bidders vie ye-to-eye at sas auction

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in the I&T Manufacturers Edition
The human factor in equipment design – Instrumentation Part III

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April 7, 1981 • Vol. 96 • No. 9

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

10: **You Can't Afford a 1½ Per Cent Mistake!** In the first of a two-part exclusive interview, management consultant Ed Walsh cites the need for accurate record keeping, especially in today's market.

16: **Prices Reflect Parched Purses.** Drought conditions in Kansas affect the prices and bidding at the All-Kansas State Consignment Auction.

18: **Different Approaches to Weeding, Mowing.** American manufacturers introduce some innovative machines for overhead weeding and hay cutting.

22: **Rating Conventional Balers.** Canada's Prairie Agricultural Machinery Institute tests three balers—John Deere's 346, Massey-Ferguson's 128 and New Holland's 320.

40: **Some New or Improved Tractors.** IH, Deutz, Ford and SAME unveil new versions to their tractor lines.

On the cover... Auction ringman Ron Carter keeps the bidding going between buyers at a farm machinery auction conducted recently in Topeka, Kan. Story on page 16.

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I&T
SINCE 1886

AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

YODER & FREY, INC.
Archbold, Ohio
(February 23, 1981)

ALLIS-CHALMERS TRACTORS

7030 diesel, 1973 (Fair)	10,500
7030 diesel, 1972 (Good)	10,700
220 diesel, front wheel assist, 1971 (Good)	8500
XT190 diesel, (Good)	6500
XT190 diesel, 1966 (Fair)	6200
190 diesel, (Fair)	2500
175, ldr., (Fair)	6250
170, (Good)	5550
D19, 1964 (Fair)	2325
D19, 1963 (Rough)	2000
D17, (Good)	2500
D17, duals, 1963 (Good)	2000
D17, (Fair)	1800
D15, (Good)	2450
WD45, 1952 (Fair)	950
G, cult., 1951 (Fair)	1250

DAVID BROWN TRACTORS

1200,	2700
1200, 1964 (Fair)	2450
950, ldr., 1964 (Rough)	1275
880, ldr., 1959 (Fair)	2675

CASE TRACTORS

2670 diesel,	14,200
2470 diesel, 1974 (Good)	13,300
1370 diesel, (Good)	12,500
1370 diesel, (Good)	10,500
1200, bld., (Fair)	8600
1070 diesel,	11,000
1070 diesel, 1973 (Good)	10,150
1070 diesel, 1972 (Good)	9000
1070 diesel, 1971 (Good)	8400
1030 diesel, (Rough)	4100
970 diesel, 1970 (Fair)	5400
930 diesel, 1964 (Fair)	4800
730, 1966 (Fair)	2500

JOHN DEERE TRACTORS

8630 diesel, 1977 (Excellent)	37,500*
4630 diesel, duals, 1976 (Good)	21,500
4520 diesel, 1970 (Excellent)	7400
4430 diesel, 1975 (Good)	19,000
4430 diesel, 1975 (Fair)	15,800
4430 diesel, 1974 (Fair)	17,900
4430 diesel, 1974 (Good)	16,500
4430 diesel, 1973 (Fair)	15,500
4430 diesel, 1972 (Good)	14,700
4320 diesel, 1971 (Good)	12,300
4320 diesel, 1971 (Fair)	8300
4320 diesel, 1970 (Good)	8700
4320 diesel, 1970 (Fair)	8100
4230 diesel, 1974 (Good)	15,500
5020 diesel,	5500
4020 diesel, 1971 (Excellent)	9200
4020 diesel, 1970 (Good)	9000
4020 diesel, 1969 (Good)	8800
4020 diesel, 1968 (Good)	8400
4020 diesel, 1967 (Fair)	8000
4020, 1967 (Fair)	4200
4020 diesel, 1966 (Good)	8100
4020 diesel, 1966 (Fair)	6800
4020 diesel, 1966 (Fair)	6600
4020 diesel, 1966 (Fair)	6400
4020, 1966 (Good)	4375
4020 LP, 1966 (Fair)	5050
4020 diesel, 1965 (Good)	6800
4020 diesel, 1965 (Fair)	6200
4010 diesel, 1961 (Good)	6600
4010 diesel, 1961 (Good)	6000
4010 diesel, 1961 (Fair)	4700
4010 diesel, 1961 (Good)	5000
4010, 1961 (Fair)	3300
3020, 1970 (Fair)	5800
3020 diesel, (Fair)	5650
3020, 1965 (Fair)	3150
3010 diesel, 1962 (Fair)	4200
3010	2950
2510 diesel, 1964 (Good)	4800
2020, ldr., (Good)	4025
2010, 1962 (Good)	2500
2010 diesel, (Fair)	2075
2010, 1963 (Fair)	1600
1010, dozer,	3550
1010, ldr., 1963 (Fair)	2950
620, 1956 (Fair)	1640
620,	1585
530, 1959 (Good)	2200
530, 1958 (Fair)	1675
520, (Good)	1600
430, 1957 (Good)	2900
70, 1955 (Fair)	1000
60, 1955 (Good)	1450
50, 1953 (Rough)	520
MT, 1952 (Fair)	725

FORD TRACTORS

9600 diesel, 1971 (Rough)	7500
8600 diesel, 1972 (Good)	7750
8000 diesel, 1969 (Fair)	6600
7600 diesel, 1976 (Excellent)	10,600
7600 diesel, 1976 (Good)	9500
6000, 1965 (Rough)	1150
6000, 1960 (Fair)	1475
5000, 1973 (Fair)	4000
5000, Sup. Maj., 1960 (Fair)	1200
4000, (Fair)	3725
4000, ldr.,	2075
3400,	4400
3000, 1967 (Fair)	2900
3000 diesel, 1964 (Fair)	3000
2000, 1956 (Fair)	2225
2000, ldr., 1956 (Good)	1560
1000, ldr., (Good)	3600
960, (Fair)	1525
871, 1957 (Fair)	1620
861 LP, ldr., 1958 (Fair)	1575
801, ldr.,	1750
Jub., 1953 (Fair)	1300
8N, 1952 (Fair)	1325
8N, 1952 (Fair)	1210

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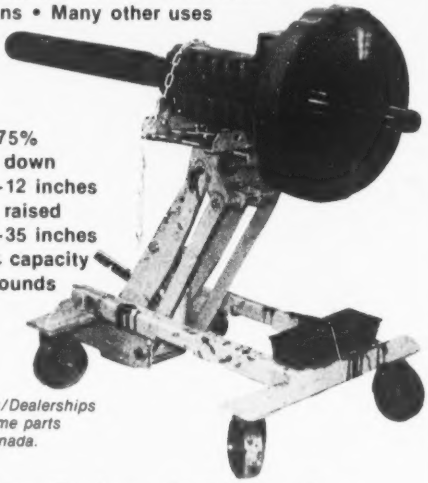

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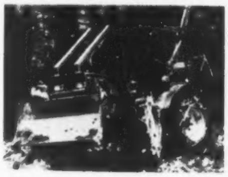

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8N, ldr., 1951 (Good)	1325
8N, ldr., 1951 (Fair)	1550
8N, ldr., 1951 (Fair)	1500
8N, 1950 (Fair)	975
8N, 1950 (Fair)	900
9N, 1946 (Good)	1000
9N, 1946 (Fair)	925
9N, 1946 (Fair)	910

INTERNATIONAL HARVESTER TRACTORS

1586 diesel, 1977 (Excellent)	17,000
1468 diesel, 1972 (Fair)	9750
1466 diesel, (Good)	12,100
1466 diesel, 1973 (Fair)	11,200
1466 diesel, 1970 (Fair)	11,000
1456 diesel, 1971 (Fair)	10,500
1256 diesel, 1968 (Fair)	6900
1206 diesel, 1963 (Fair)	5950
1086 diesel, bld., 1977 (Good)	17,850
1086 diesel,	15,350
1066, 1973 (Good)	11,500
1066 diesel, 1973 (Fair)	8900
966 diesel, (Good)	12,400
966 diesel, (Good)	10,250
856 diesel, 1967 (Fair)	7400
856, 1967 (Good)	7300
826 diesel, (Good)	6200
826, (Good)	6150
856, 1967 (Good)	9500
806 diesel, 1967 (Fair)	5900
806 diesel, 1967 (Fair)	5400
806, 1966 (Fair)	5250
806, 1966 (Fair)	3200
806 diesel,	5700
806 diesel, 1963 (Fair)	5150
756 diesel, 1968 (Fair)	6000
706 diesel, 1968 (Good)	7200
706 diesel, 1966 (Fair)	4100
706 diesel, 1965 (Good)	6500
706, 1965 (Fair)	3700
656 diesel, 1967 (Good)	4800
656, hydro, 1967 (Good)	3600
560,	2000
560, 1961 (Rough)	1950
560, 1960 (Fair)	1750
560, 1959 (Fair)	1875
560, 1959 (Fair)	1750
560, (Fair)	1700
504, 1965 (Good)	2800
460, 1961 (Fair)	2300
460	1425
454, ldr., 1972 (Fair)	4300
450, 1957 (Fair)	1475
434, ldr., 1964 (Fair)	2800
434, 1959 (Rough)	2250
404, ldr., 1958 (Fair)	2500
400, 1957 (Fair)	1300
400, (Fair)	1125
230, 1959 (Fair)	1085
400, 1958 (Fair)	950
Sup. MTA, 1954 (Fair)	1380
Sup. M, (Good)	1275
Sup. M, 1953 (Fair)	1025
M, (Good)	1450
M, 1950 (Fair)	1150
M,	1080
M, 1950 (Fair)	900
Sup. H, 1952 (Good)	1075
Sup. A, cult., 1951 (Fair)	1850
C, cult.,	1175
Cub Loboy, mo., 1956 (Good)	3050
Cub, 1950 (Fair)	1425

MASSEY-FERGUSON TRACTORS

1100, (Fair)	3200
1085 diesel, 1978 (Excellent)	12,200*
1080 diesel, 1970 (Good)	5200
275, 1977 (Excellent)	7350
235, 1978 (Excellent)	4450
165,	3650
165, ldr., 1964 (Fair)	3575
165, 1964 (Fair)	3475
165, (Fair)	3185
135, ldr., (Good)	3060
135, (Good)	2875
Sup. 90,	2600
85 diesel, 1957 (Fair)	1475
65, (Good)	2450
65, 1963 (Fair)	1825
50, ldr., (Good)	2325
35, ldr., (Good)	3350
35, (Good)	2460
35, (Good)	2450

OLIVER TRACTORS

1955 diesel, (Good)	7550
1855, 1970 (Fair)	5600
1850 diesel, 1965 (Fair)	5200
1850, 1964 (Fair)	3725
1800, ldr., (Fair)	2925
1750, (Good)	3800
1655, (Excellent)	7000
1600, 1962 (Fair)	3750
880 diesel,	1400
550,	1800

MINNEAPOLIS-MOLINE TRACTORS

G1350 diesel, 1972 (Good)	8500
G1000 diesel, (Good)	3525
950 diesel, (Good)	4000
Sup. 670 diesel, (Fair)	2900
302 Sup., 1959 (Fair)	1875

STEIGER TRACTOR

Bearcat 1, 1973 (Fair)	16,500

WHITE TRACTOR

4-180 diesel, 1974 (Good)	11,000

NOTES

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FARM TRACTORS:

1. Where the horsepower went in 1980 page 14
2. Makes, models on the 1981 market page 16

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U.S. farm equipment going to Cuba? page 5

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in this issue...

8: **Two International Shows.** I&T visits the California Farm Equipment Show at Tulare and CONEXPO '81, the International Construction Equipment Exposition at Houston, Tex.

14: **Where the Horsepower Went in 1980.** There were some subtle but interesting shifts in retail sales of tractors in 1980, compared with 1979...and some happy news.

16: **Makes and Models of Farm Tractors on the 1981 North American Market.**

20: **Dealership Management.** Capital use, new buildings, satellites, parts margins, and people productivity are topics of a conversation with consultant Ed Walsh, part 2.

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what's ahead...

I&T
SINCE 1886

April 21, 1981

FEBRUARY RETAIL SALES of farm equipment in the U.S., as presented in the flash report of the Farm & Industrial Equipment Institute, were a mixed bag, with more downs than ups. Sales of four-wheel-drive tractors and self-propelled combines were up moderately and baler sales were strongly higher. Two-wheel-drive tractors, particularly the larger sizes, were still slumped. FIEI always warns that month-to-month comparisons of retail data are to be made with great caution because of the seasonal nature of the business. The flash report:

Unit Retail Sales

	February			January-February		
	1981	1980	Pct. Change	1981	1980	Pct. Change
Farm Wheel Tractors:						
2-wheel drive						
40-100 hp	3,055	3,328	- 8.3	7,000	7,914	-11.6
Over 100 hp	2,454	3,700	-33.7	5,633	8,297	-32.2
Total 2-wheel drive	5,509	7,028	-21.7	12,633	16,211	-22.1
4-wheel drive	610	585	+ 4.2	1,440	1,492	- 3.5
Total Tractors	6,119	7,613	-19.7	14,073	17,703	-20.6
Combines (S-P)	1,016	980	+ 3.6	2,691	2,433	+10.6
Balers*	416	323	+28.7	848	756	+12.1
Forage Harvesters**	173	275	-37.1	447	634	-29.5
Mower-Conditioners	530	564	- 6.1	1,164	1,222	- 4.8

*Bales under 200 lbs. **Shear-bar type.

DIESEL FUEL CONSUMPTION/ECONOMY DATA take on new significance with each rise in diesel prices. According to the USDA Economics and Statistics Service, the average price farmers paid per gallon of diesel was $1.13 in February, up 7 cents from the previous month and up 17.8 cents from February, 1980. Best diesel buys for farmers were on the West Coast (California, $1.03 per gallon; Washington, $1.06; Oregon, $1.08). Worst price averages were $1.33 in New York and $1.32 in South Carolina. The average price in Illinois and Indiana, $1.22; in Iowa, $1.15; Wisconsin, $1.19; Ohio, $1.20; Texas, $1.18.

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RETAIL SALES OF SELECTED FARM EQUIPMENT—Jan.-Dec., 1979 and 1980 (1)

(In Units)

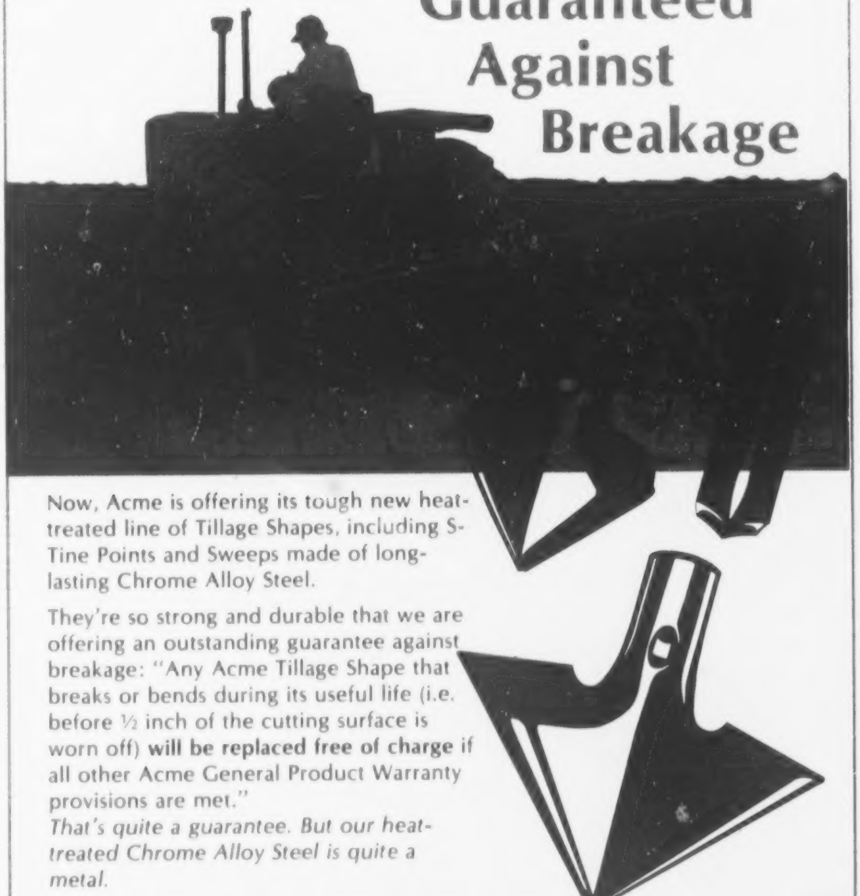
	Combines Self-Propelled		Corn Heads		Hay Balers (2)		Windrowers Self-Propelled Power Units		Windrowers Self-Propelled Total Heads		Grinder-Mixers		Shear-Bar Forage Harvesters (3)	
	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980
Alabama	504	245	107	66	252	153	1	2	1	1	231	135	63	37
Alaska	6	5	.....	.....	9	19	.....	3	.....	4	.....	1	.....	.....
Arizona	35	60	5	7	43	44	63	64	69	76	4	8	16	11
Arkansas	1,123	672	11	5	427	186	2	.....	1	.....	62	82	28	11
California	237	284	65	53	244	174	300	281	327	311	15	5	80	74
Colorado	316	341	166	158	507	437	284	222	289	237	70	68	195	102
Connecticut	2	.....	1	.....	67	58	.....	.....	.....	.....	2	1	68	42
Delaware	55	43	37	44	18	15	.....	1	.....	1	12	8	15	12
Florida	148	78	76	51	113	77	3	.....	3	.....	64	46	26	26
Georgia	764	384	532	302	244	197	1	1	1	1	542	265	133	105
Hawaii	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Idaho	371	440	12	22	505	600	357	404	369	413	48	66	74	75
Illinois	3,305	2,708	3,533	2,821	399	327	15	23	15	23	679	496	365	261
Indiana	1,964	1,489	2,095	1,615	422	316	12	8	12	8	605	390	263	191
Iowa	3,474	2,928	4,191	3,108	459	328	262	137	257	145	2,062	1,290	930	565
Kansas	1,851	1,888	425	343	495	312	411	290	421	300	363	252	348	263
Kentucky	579	363	412	284	455	292	3	3	4	3	345	306	235	182
Louisiana	650	447	2	3	164	68	.....	.....	.....	.....	17	21	26	19
Maine	2	7	.....	.....	89	70	3	2	3	2	1	1	63	46
Maryland	161	149	171	171	137	118	8	13	7	14	51	39	123	77
Massachusetts	.....	.....	.....	.....	59	50	1	6	.....	6	1	3	38	39
Michigan	609	596	592	566	483	382	81	64	85	65	273	263	527	420
Minnesota	2,085	1,652	2,004	1,481	971	735	781	648	804	666	918	629	1,199	873
Mississippi	891	543	10	6	209	79	.....	2	.....	2	70	48	76	62
Missouri	1,676	1,043	939	501	685	436	87	86	89	94	667	509	217	191
Montana	393	414	5	7	413	388	511	443	551	491	87	76	48	37
Nebraska	1,845	1,517	1,816	1,416	257	211	518	307	525	321	633	504	486	359
Nevada	4	3	.....	.....	59	40	76	59	77	63	2	2	6	8
New Hampshire	.....	.....	.....	.....	59	58	1	.....	1	.....	2	.....	39	34
New Jersey	48	26	17	21	65	41	.....	1	.....	1	14	11	32	17
New Mexico	32	42	12	16	168	128	99	63	99	67	19	12	11	9
New York	179	191	287	243	812	769	74	69	74	70	133	129	1,054	853
North Carolina	662	419	530	400	327	303	3	2	3	2	257	162	141	96
North Dakota	1,383	1,014	86	58	96	58	922	588	986	639	194	146	155	144
Ohio	1,654	1,213	1,582	1,132	709	528	14	9	14	9	538	406	391	269
Oklahoma	620	642	15	23	907	407	168	104	172	111	187	131	61	38
Oregon	220	243	13	10	335	413	260	281	265	301	37	33	87	49
Pennsylvania	283	198	305	291	977	751	89	55	90	57	350	321	789	539
Rhode Island	.....	.....	.....	.....	6	7	.....	7	.....	6	1	.....	1	1
South Carolina	384	221	194	131	102	85	.....	.....	.....	.....	127	66	38	37
South Dakota	725	513	540	302	183	98	784	538	842	580	429	332	485	395
Tennessee	692	381	223	156	610	389	1	1	1	1	289	207	229	145
Texas	966	974	278	303	1,445	762	119	86	132	91	270	250	86	85
Utah	41	40	15	10	329	339	156	131	158	144	78	33	97	99
Vermont	.....	1	.....	1	132	110	1	4	1	4	3	.....	177	159
Virginia	259	125	221	127	488	393	7	7	7	7	165	97	259	202
Washington	381	460	71	39	348	432	213	195	226	198	20	21	104	146
West Virginia	3	5	6	7	265	166	.....	1	.....	1	36	28	58	31
Wisconsin	611	675	755	832	1,988	1,481	397	394	401	403	661	542	2,457	1,978
Wyoming	52	59	16	14	214	192	203	197	212	213	33	27	52	45
U.S. Government	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous (4)	.....	.....	1	7	.....	.....	.....	.....	.....	.....	6	.....	.....	.....
TOTAL	**32,246**	**25,741**	**22,374**	**17,154**	**18,750**	**14,022**	**7,291**	**5,802**	**7,594**	**6,152**	**11,673**	**8,468**	**12,451**	**9,461**

Data released Feb. 18, 1981, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled.

(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intraplant or company transfers, etc.

Mower Conditioners All Types		Manure Spreaders Conveyor-Type		
1979	1980	1979	1980	
242	141	18	18	Alabama
2	8	1	1	Alaska
6	12	9	8	Arizona
574	371	115	89	Arkansas
49	45	86	70	California
166	160	71	58	Colorado
90	96	85	64	Connecticut
18	19	73	58	Delaware
124	87	30	31	Florida
279	229	51	47	Georgia
1	.....	2	1	Hawaii
123	167	137	137	Idaho
773	606	916	593	Illinois
709	529	717	489	Indiana
1,480	1,095	2,391	1,393	Iowa
1,010	638	263	201	Kansas
1,217	817	316	266	Kentucky
126	48	26	29	Louisiana
121	117	119	113	Maine
182	116	230	215	Maryland
81	53	76	72	Massachusetts
786	685	824	750	Michigan
1,474	1,062	1,995	1,537	Minnesota
198	101	31	19	Mississippi
1,787	1,199	441	321	Missouri
129	155	50	51	Montana
623	485	549	345	Nebraska
12	9	7	6	Nevada
70	75	53	59	New Hampshire
80	58	63	55	New Jersey
38	23	8	11	New Mexico
1,265	1,178	1,649	1,545	New York
389	285	166	145	North Carolina
172	140	114	107	North Dakota
1,121	808	1,033	820	Ohio
960	617	36	57	Oklahoma
201	279	135	112	Oregon
1,252	934	1,429	1,222	Pennsylvania
6	4	1	.....	Rhode Island
141	79	32	30	South Carolina
147	91	362	216	South Dakota
943	569	188	156	Tennessee
1,548	1,120	153	144	Texas
168	205	106	118	Utah
253	250	282	223	Vermont
762	674	261	232	Virginia
156	262	150	137	Washington
250	177	99	64	West Virginia
3,202	2,519	3,103	2,253	Wisconsin
74	55	54	37	Wyoming
.....	.....	.....	.....	U.S. Government
.....	.....	1	8	Miscellaneous
25,600	**19,452**	**19,107**	**14,733**	**TOTAL**



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FARM TRACTOR HORSEPOWER:

■IF YOU have the spirit to study the 1980 farm tractor retail sales horsepower table we're presenting here in comparison with 1979 results (see I&T April 21, 1980), you'll probably run into some subtle but interesting shifts.

In the four-wheel-drive tractor group, the sales slump was scarcely felt by the under-200-hp bracket, where volume was off by only 112 units, going from 4,944 in 1979 to 4,832 in 1980. And this was in spite of International Harvester's strike, which lasted through the first four months of the year. (IH's 2+2 line consists of under-200-hp sizes exclusively.)

The top category of the four-wheelers—over 250 hp—went up in sales by about 20 per cent, from 1,585 to 1,896 units. The middle bracket—200-249 hp—experienced the substantial decline, falling 16 per cent from 4,926 and 4,159 retail sales.

There were 52,328 two-wheel-drive tractors of 100 hp or more sold last year, down 12,000 from the year before. Units of 150 hp or more had 26 per cent of that market in 1979 and 29 per cent in 1980—an inching up.

Happy news

After a solid year of generally depressing sales data, I&T was resolved to come up with something of an uplifting nature as part of this annual review. We found it. The tractor markets may have been down substantially in Iowa, Texas, Wisconsin, Kansas and some other farm areas, but the "miscellaneous" department was booming! It went from only 49 units in 1979 to 374 last year, a 663 per cent improvement. And the United States Government also increased its purchases—from 155 units to 220—by 42 per cent!

There were several states that posted tractor sales increases that were pretty good. The only problem was that there weren't enough tractors involved in the improvement. We're talking about states such as Connecticut (up 25 per cent to 236 units), Arizona (up 25 per cent to 993 tractors), Montana (up 6 per cent to 1,438) and Florida (up 11 per cent to 2,593). ☐

	Two-Wheel-Drive Tractors						
State	40-49	50-59	60-69	70-79	80-99	100-119	120-129
Alabama	629	273	236	129	231	185	46
Alaska	4	9	5	2	4	1	.....
Arizona	73	30	81	105	129	112	14
Arkansas	612	323	275	84	117	75	72
California	596	695	951	475	553	309	69
Colorado	116	105	90	28	100	102	45
Connecticut	60	40	64	21	20	13	.....
Delaware	14	20	23	10	18	17	4
Florida	537	338	534	310	341	198	29
Georgia	775	310	304	202	263	194	75
Hawaii	32	18	9	7	9	1	.....
Idaho	91	119	152	34	180	191	72
Illinois	213	251	409	284	410	551	257
Indiana	272	230	296	169	306	348	147
Iowa	78	150	419	247	606	934	306
Kansas	144	128	174	75	270	477	209
Kentucky	974	802	624	301	444	187	49
Louisiana	546	269	298	121	124	124	51
Maine	67	50	43	11	26	29	2
Maryland	159	103	92	52	71	85	18
Massachusetts	34	41	24	14	19	5	.....
Michigan	280	317	369	176	310	307	81
Minnesota	102	236	469	241	634	784	201
Mississippi	626	274	230	158	226	181	75
Missouri	469	461	489	178	481	378	158
Montana	197	130	148	37	156	135	81
Nebraska	50	58	114	44	308	612	180
Nevada	17	19	15	4	13	14	3
New Hampshire	51	33	31	6	14	8	.....
New Jersey	86	61	38	15	40	19	3
New Mexico	92	37	39	46	27	31	12
New York	258	376	493	191	527	314	39
North Carolina	987	529	426	288	480	258	63
North Dakota	17	32	43	19	79	236	149
Ohio	494	457	473	216	466	414	125
Oklahoma	309	180	181	78	270	389	103
Oregon	361	270	204	54	144	105	21
Pennsylvania	311	375	430	117	386	276	42
Rhode Island	7	4	3	.....	1	1	.....
South Carolina	394	183	177	116	144	99	30
South Dakota	16	35	73	40	233	360	110
Tennessee	877	471	348	157	271	180	52
Texas	1,843	894	915	539	806	709	267
Utah	73	126	122	41	87	61	22
Vermont	44	69	83	23	60	31	1
Virginia	608	397	343	143	263	142	19
Washington	594	534	256	64	150	81	21
West Virginia	196	127	57	35	27	4	2
Wisconsin	146	444	865	401	890	760	202
Wyoming	27	47	29	11	73	55	16
U.S. Government	23	.....	37	149	5	1	.....
Miscellaneous	66	37	45	222	2	.....	.....
TOTAL	**15,647**	**11,517**	**12,648**	**6,490**	**11,814**	**11,081**	**3,543**

Turn page for: **FARM TRACTORS Makes & Models on the 1981 North American Market**

THE 1980 STORY

1980 Retail Sales of Farm Wheel Tractors by PTO Horsepower (in units)

					Four-Wheel-Drive Tractors					
130-139	140-149	150-179	180 & over	Total 2-Wheel Drive	Under 200	200-249	250 & over	Total 4-Wheel Drive	All Farm Wheel Tractors	State
199	41	106	62	2,137	30	24	11	65	2,202	Alabama
.....	.....	.....	.....	25	.....	4	2	6	31	Alaska
113	38	94	100	889	31	42	31	104	993	Arizona
306	165	452	456	2,937	106	158	84	348	3,285	Arkansas
325	49	232	119	4,373	132	177	136	445	4,818	California
247	28	152	88	1101	76	113	41	230	1,331	Colorado
9	1	2	.....	230	5	1	.....	6	236	Connecticut
18	2	6	5	137	2	5	2	9	146	Delaware
110	24	42	18	2,479	46	50	18	114	2,593	Florida
389	81	180	120	2,893	11	32	8	51	2,944	Georgia
.....	.....	1	.....	77	1	.....	1	2	79	Hawaii
215	56	115	20	1,245	83	95	28	206	1,451	Idaho
1,371	358	1,017	430	5,551	423	316	152	891	6,442	Illinois
683	187	410	218	3,266	232	196	87	515	3,781	Indiana
2,029	556	788	250	6,363	404	267	102	773	7,136	Iowa
894	154	637	393	3,555	290	382	95	767	4,322	Kansas
206	42	103	61	3,793	34	28	16	78	3,871	Kentucky
208	161	340	424	2,666	84	122	58	264	2,930	Louisiana
10	.....	2	1	241	3	.....	.....	3	244	Maine
57	17	29	8	691	12	13	7	32	723	Maryland
3	1	.....	.....	141	1	.....	.....	1	142	Massachusetts
435	90	166	57	2,588	188	110	51	349	2,937	Michigan
1,106	226	424	110	4,533	378	274	115	767	5,300	Minnesota
331	107	563	470	3,241	72	90	98	260	3,501	Mississippi
582	157	323	165	3,841	101	81	66	248	4,089	Missouri
112	37	76	27	1,136	96	134	72	302	1,438	Montana
1,036	240	512	218	3,372	223	112	44	379	3,751	Nebraska
15	1	3	1	105	7	5	.....	12	117	Nevada
3	.....	.....	.....	146	2	.....	.....	2	148	New Hampshire
19	4	4	7	296	3	.....	1	4	300	New Jersey
59	7	40	11	401	8	5	6	19	420	New Mexico
211	31	51	11	2,502	72	23	20	115	2,617	New York
220	60	99	85	3,495	33	16	6	55	3,550	North Carolina
540	120	307	128	1,670	386	378	141	905	2,575	North Dakota
572	132	233	110	3,692	204	133	74	411	4,103	Ohio
650	62	274	119	2,615	162	178	33	373	2,988	Oklahoma
106	13	47	14	1,339	51	29	10	90	1,429	Oregon
128	25	27	9	2,126	28	12	12	52	2,178	Pennsylvania
.....	.....	.....	.....	16	.....	.....	.....	.....	16	Rhode Island
122	31	57	63	1,416	18	25	7	50	1,466	South Carolina
506	73	200	50	1,696	153	96	38	287	1,983	South Dakota
268	57	140	119	2,940	41	30	25	96	3,036	Tennessee
1,651	334	857	608	9,423	276	234	114	624	10,047	Texas
57	12	20	5	626	17	10	7	34	660	Utah
16	3	6	1	337	4	.....	.....	4	341	Vermont
102	22	31	31	2,101	15	8	2	25	2,126	Virginia
91	11	43	8	1,853	86	76	38	200	2,053	Washington
6	1	.....	1	456	.....	.....	.....	.....	456	West Virginia
589	153	204	76	4,730	175	69	28	272	5,002	Wisconsin
59	19	17	15	368	27	6	9	42	410	Wyoming
2	.....	3	.....	220	.....	.....	.....	.....	220	U.S. Government
.....	1	.....	1	374	.....	.....	.....	.....	374	Miscellaneous
16,986	**3,990**	**9,435**	**5,293**	**108,444**	**4,832**	**4,159**	**1,896**	**10,887**	**119,331**	**TOTAL**

DATA: Farm & Industrial Equipment Institute. Figures do not include garden tractors, motor tillers, or contractor's off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland, Satoh); Allis-Chalmers; Belarus; J I Case; Deere; Deutz; Ford; International Harvester; Long; Massey-Ferguson; Steiger; Versatile; R. M. Wade (Satoh); and White. Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

Implement & Tractor

5/21/81 C 4725-1

High-speed farming: How fast is fast enough?

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The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

8: **High-Speed Farming: How Fast Is Fast Enough?** Changes that have taken place over the years both in implements and tractors to accommodate faster field speeds are reviewed in the first of two articles by Frank Buckingham.

14: **Ethanol: A Fuel Whose Time Has Not Yet Come.** The technology and equipment to produce ethanol for farm use is available, but interest has waned in recent months due to many factors including stabilizing prices and an ample supply of petroleum fuel.

24: **SIMA Report.** Graham Fuller visits the Salon International de la Machine Agricole in Paris and reports on some innovations displayed by European manufacturers.

34: **Taking on New Lines.** An I&T survey reveals what dealers look for when considering additions to, or changes of, product lines.

46: **What Makes a Good Dealer Council Work?** Agribusiness consultant Bruce Symonds outlines some major criteria for organizing and sustaining a dealer council.

On the cover... We have no idea how fast the John Deere tractor on the cover was going when the picture was taken, but the natural distortion produced by the camera's wide-angle lens suggested intense speed – bending around a curve – and so it seemed a natural illustration for our High-Speed Farming story.

DEPARTMENTS

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what's ahead...

I&T
SINCE 1886

May 7, 1981

U.S. FARM EQUIPMENT RETAIL SALES THROUGH MARCH, according to the Farm & Industrial Equipment Institute's flash report, reflected the general cautiousness noted by most industry observers in recent months. The brighter spots in March were sales of tractors in the 40-99 hp group, four-wheel-drive tractors and conventional balers. The full report:

Unit Retail Sales

	March			January-March		
	1981	1980	Pct. Change	1981	1980	Pct. Change
Farm Wheel Tractors:						
2-wheel drive						
40-100 hp	5,373	5,089	+ 5.6	12,216	13,003	- 6.1
Over 100 hp	3,498	4,259	-17.9	9,134	12,556	-27.3
Total 2-wheel drive	8,871	9,348	- 5.1	21,350	25,559	-16.5
4-wheel drive	880	873	+ 0.8	2,317	2,365	- 2.0
Total Tractors	9,751	10,221	- 4.6	23,667	27,924	-15.2
Combines (S-P)	1,128	1,217	- 7.3	3,819	3,650	+ 4.6
Balers*	610	576	+ 5.9	1,468	1,332	+10.2
Forage Harvesters**	307	366	-16.1	751	1,000	-24.9
Mower Conditioners	920	956	- 3.8	2,084	2,178	- 4.3

*Bales under 200 lbs. **Shear-bar type.

PROJECTING THE SHAPE OF U.S. FARMS AT THE TURN OF THE CENTURY, three USDA economists, William Lin, George Coffman and J. B. Penn, expect that 1 per cent of U.S. farms will account for about half of all farm production and the bottom 50 per cent of farms will produce only 1 per cent by the year 2000. At that time, they estimate, almost two-thirds of the production will likely come from the largest 50,000 farms, and capital requirements will rise to about $2 million of capital assets per farm for farms with sales of $100,000 or more--nearly double what was required in 1978.

DESPITE INDICATIONS THAT PRODUCER PRICES FOR FARM PRODUCTS may rise in coming months, the increases are expected to be small and of limited duration, according to Continental Illinois National Bank, Chicago. Terry Francl, the bank's ag economist, noted that weather developments in the northern hemisphere in 1981 will strongly influence prices and that corn and soybean producers' planting intentions may indicate concern about below-normal subsoil moisture in much of the Corn Belt. Livestock producers, he added, may get higher prices later this year as cutbacks in production take effect.

SHORT-TERM INTEREST RATES, such as the bank prime rate and the

(Continued on page 6)

I&T
SINCE 1886

AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

YODER & FREY, INC.
Archbold, Ohio
(March 9 & 10, 1981)

ALLIS-CHALMERS TRACTORS

7050 diesel, 1977 (Fair)	9100*
7040 diesel, 1976 (Excellent)	12,900
7030 diesel, 1975 (Good)	8900
XT190 diesel, (Good)	6100*
XT190, 1968 (Good)	4350
XT190 diesel, 1968 (Fair)	4800
190, 1964 (Fair)	3300
XT190 LP, 1967 (Fair)	2650*
221 diesel, 1970 (Fair)	7400
180 diesel, 1971 (Good)	5950
175, ldr., 1972 (Fair)	6200
170, 1967 (Fair)	4900
D19, 1964 (Fair)	2450
D17 diesel, 1962 (Fair)	3250
D17, 1962 (Fair)	1300
D17, 1960 (Fair)	1700*
WD45, plow, 1952 (Fair)	1150
WD, 1948 (Fair)	720
WD, 1948 (Fair)	710

CASE TRACTORS

1370 diesel, 1975 (Fair)	9600*
1200, bld., (Fair)	7600*
1030 diesel, 1964 (Fair)	4875
1030 diesel, 1964 (Fair)	3750*
930 diesel, 1961 (Fair)	3025
830, 1962 (Fair)	3200
630, 1958 (Fair)	1700
600, 1954 (Fair)	820
430, 1959 (Fair)	2300
500 diesel, 1957 (Good)	1700

DAVID BROWN TRACTORS

1200, 1965 (Good)	3000*
1200, 1963 (Fair)	2400*
995, 1971 (Fair)	3450
990, 1962 (Fair)	1625

JOHN DEERE TRACTORS

8630 diesel, 1977 (Excellent)	35,600
7520 diesel, 1972 (Good)	15,500*
4630 diesel, duals, 1976 (Excellent)	20,750
4620 diesel, 1969 (Good)	10,250*
4620 diesel, 1969 (Fair)	8450
4620 diesel, 1969 (Good)	8100*
4520 diesel, 1970 (Fair)	10,600
4520 diesel	9200
4520 diesel, 1970 (Fair)	7950
4520 diesel, 1969 (Good)	7300*
4430 diesel, 1976 (Excellent)	19,300*
4430 diesel, 1976 (Good)	16,200*
4430 diesel, 1973 (Fair)	11,600
4320 diesel, 1971 (Good)	10,200
4320 diesel, 1971 (Fair)	9000*
4320 diesel, 1971 (Fair)	8100*
4230 diesel, 1975 (Good)	16,500
4230 diesel, 1974 (Excellent)	14,300
4230 diesel, 1974 (Fair)	11,800*
4230 diesel, 1974 (Fair)	11,000
4020 diesel, 1970 (Excellent)	9050
4020 diesel, 1968 (Good)	8500
4020 diesel, 1968 (Good)	7950
4020 diesel, 1967 (Fair)	8050
4020 diesel, 1967 (Fair)	5400*
4020 diesel, 1966 (Fair)	7000
4020 diesel, 1966 (Fair)	6850*
4020 diesel, 1966 (Fair)	5900
4010, 1963 (Good)	4500
4010 diesel, 1963 (Fair)	4200
4010 diesel, 1960 (Good)	4475
4010 LP, 1961 (Fair)	3200
3020 diesel, 1968 (Good)	5750*
3020 diesel, 1968 (Good)	5200
3020 diesel, 1968 (Fair)	4775
3020, 1966 (Good)	4100
3010, 1963 (Rough)	3375
3010, 1962 (Fair)	2375
2520, 1969 (Good)	4225
2510, 1966 (Good)	3425
2240, ldr., (Good)	8000
2010, 1964 (Good)	3400
2010, 1963 (Fair)	2000
2010, ldr., 1961 (Good)	3450
2010, 1961 (Fair)	3000
2010, ldr., 1960 (Rough)	1700
730 diesel, 1960 (Good)	2600
730 diesel, 1958 (Good)	2100
620, 1956 (Fair)	1425
520, 1956 (Fair)	1500*
430, 1957 (Fair)	1375
70, 1956 (Good)	1500
60, 1954 (Good)	1230
60, 1956 (Fair)	875

FORD TRACTORS

9000 diesel, 1970 (Good)	7400
9000 diesel, 1970 (Good)	7400*
6000, 1961 (Good)	1700
5000, 1971 (Good)	5350
5000, 1968 (Fair)	3100*
4000, 1975 (Fair)	4075*
4000 diesel, 1963 (Fair)	2400
4000, ldr., 1957 (Fair)	1910
3600, (New)	8100*
3600 diesel, (Excellent)	7800*
3400, ldr., 1970 (Fair)	3100*
3400, Select-O-Speed, 1970 (Fair)	1975
3000, ldr., 1969 (Good)	3700
871, 1955 (Good)	1600
861 LP, ldr.,	1500
860, ldr., 1957 (Good)	1825
800, ldr., 1956 (Fair)	1975
800, 1954 (Fair)	1830
660, 1956 (Fair)	1625
NAA, 1953 (Fair)	1375
Jub., 1953 (Fair)	1290
Sup. Maj., 1956 (Fair)	1025
8N, 1952 (Fair)	1100
8N, 1952 (Fair)	1075
8N, 1951 (Good)	1525
8N, ldr., 1950 (Rough)	1185
8N, 1950 (Fair)	1060
8N, 1950 (Fair)	1050
8N, 1949 (Fair)	1025
8N, 1949 (Good)	1600
8N, 1948 (Fair)	975
9N, 1946 (Fair)	890
9N, 1944 (Fair)	800

INTERNATIONAL HARVESTER TRACTORS

1566 diesel, cab, air, 1974 (Good)	11,800*
1566 diesel, 1972 (Fair)	10,500*
1466 diesel, 1972 (Good)	12,650
2500, ldr.	3400
1256 diesel, 1967 (Rough)	5850
1206 diesel, 1967 (Fair)	5450
1206, 1963 (Good)	5850
1086 diesel, 1977 (Fair)	15,000*
1066 diesel, 1972 (Good)	12,000
966 diesel, 1972 (Fair)	8300*
966 diesel, 1973 (Fair)	9350
966 diesel, (Good)	7800*
886 diesel, 1977 (Fair)	10,800
856 diesel, 1968 (Fair)	7500
856, 1967 (Fair)	7750
856 diesel, 1970 (Fair)	7500
826	6200
766 diesel, 1972 (Good)	8350*
806 diesel	6900
806 diesel, 1966 (Fair)	5600*
806 diesel, 1965 (Fair)	5050
806, 1964 (Fair)	5650
806 diesel, 1964 (Good)	6350
806 diesel, 1963 (Fair)	5450
806 diesel, 1964 (Fair)	4300
766, 1972 (Good)	6400
706 diesel, 1965 (Good)	4675
706 diesel, 1964 (Fair)	4400
706, 1963 (Good)	4800
706, 1963 (Good)	4800
666, 1972 (Excellent)	6400
656 diesel, 1967 (Good)	5350
656, 1967 (Fair)	3000
560, (Fair)	2450
560, ldr., (Rough)	1575
560, 1960 (Fair)	1550
560, 1959 (Fair)	1500
560 diesel, 1958 (Fair)	1450
474, 1972 (Good)	4925
460, 1961 (Good)	1900
460, 1960 (Fair)	1700
460, 1960 (Fair)	1700
460, 1959 (Good)	1800
460, 1959 (Fair)	1500
460 LP, 1959 (Fair)	1125*
434, ldr., 1963 (Fair)	2900
434	2250
B414, 1949 (Fair)	1200
400, 1956 (Good)	1625
340, ldr., 1958 (Rough)	1600
B275, ldr., 1958 (Good)	1825
B275, ldr., 1956 (Fair)	1050
Sup. M,1953 (Good)	1450
Sup. M	1425
Sup. M, 1953 (Fair)	1375
MTA, 1953 (Fair)	1250
Sup. M, 1953 (Fair)	1125
M, ldr., (Rough)	975
M, 1951 (Fair)	785
Sup. H, 1953 (Good)	1125
H, 1946 (Fair)	565
A, cult., 1950 (Fair)	1125
A, 1948 (Fair)	725
Sup. C, 1951 (Fair)	1050
Cub Loboy, mo., 1969 (Good)	1725

MASSEY-FERGUSON TRACTORS

2675 diesel, 1979 (Excellent)	16,600*

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Auctions *(continued)*

1150 diesel, 1972 (Fair)	6800
1105 diesel, 1978 (Excellent)	13,700*
1100, 1964 (Fair)	2500
1085, 1978 (Excellent)	12,800
245, ldr., 1977 (Fair)	5175
202	2300
180, 1970 (Fair)	3400*
175, 1965 (Fair)	4400
135, 1964 (Fair)	4025
65 diesel, 1958 (Good)	2850
65, ldr.,	1650
35, 1960 (Fair)	1550

OLIVER TRACTORS

1850, 1966 (Rough)	3500
1850 diesel, 1965 (Fair)	4075
1850, 1964 (Fair)	3400*
1850, 1962 (Fair)	3950
1800 diesel, 1963 (Good)	3550
1800, 1963 (Fair)	3150
1800, 1962 (Good)	2450
1800, 1962 (Good)	2800*
1800, 1962 (Fair)	2350*
1650 diesel, 1962 (Fair)	4150
880, 1960 (Fair)	1150
880	1100
Sup. 99	1925
77, 1950 (Fair)	500

VERSATILE TRACTOR

750 diesel, 1978 (Good)	34,000*

WHITE TRACTORS

4-180, 1974 (Fair)	14,500*
4-150, 1973 (Fair)	13,300*
2-255, 1970 (Fair)	10,500*
2-150, 1977 (Good)	13,000
2-105, 1973 (Rough)	9250

JONES FARM EQUIPMENT CO.
Dothan, Alabama
(March 10, 1981)

ALLIS-CHALMERS TRACTORS

7045 diesel, cab, duals, 1978 (Excellent)	13,250*
7045 diesel, duals, cab, 1978 (Excellent)	13,500*
7040 diesel, 1977 (Fair)	7000
D17, 1958 (Rough)	425
C, har., 1946 (Rough)	375
G, cult., plt., plow, 1949 (Good)	1000*

CASE TRACTORS

611B, 1958 (Good)	1450
580 diesel, ldr., backhoe, 1971 (Good)	4750*
430 diesel, 1968 (Fair)	1250*
VAC, (Rough)	100

DEUTZ TRACTOR

8005 diesel, (Good)	4300*

MASSEY-FERGUSON TRACTORS

1800 diesel, 1971 (Good)	5600*
1155 diesel, 1973 (Fair)	8250
1155 diesel, 1973 (Fair)	7600*
1155 diesel, 1973 (Fair)	7600*
1105 diesel, duals, 1974 (Fair)	5550*
1100 diesel, 1967 (Fair)	3750*
1085 diesel, 1974 (Good)	5500
1085 diesel, 1974 (Excellent)	6400
1080 diesel, 1971 (Good)	4200*
285 diesel, 1977 (Excellent)	7800*
285 diesel, 1966 (Excellent)	7300*
275 diesel, 1976 (Good)	6400*
275 diesel, 1975 (Good)	6600
245 diesel, 1977 (Excellent)	6800
180 diesel, 1969 (Good)	3800*
180 diesel, 1968 (Fair)	3400*
180 diesel, 1967 (Fair)	3500*
180 diesel, 1966 (Rough)	2800*
175 diesel, 1968 (Good)	3700*
165 diesel, 1971 (Fair)	3400
165 diesel, 1967 (Fair)	2850
165 diesel, 1966 (Fair)	3000
165 diesel, 1966 (Rough)	2400
165 diesel, 1966 (Good)	3350
150 diesel, 1968 (Fair)	2500
150 diesel, 1967 (Good)	3000
150 diesel, 1965 (Good)	3000
150 diesel, 1965 (Good)	3250*
135, 1974 (Excellent)	4600*
135, 1966 (Fair)	2250
130 diesel, 1968 (Good)	1725
65 diesel, 1964 (Good)	2050
65 diesel, 1964 (Good)	2100*
65 diesel, 1964 (Good)	2100*
65 diesel, 1963 (Good)	2200
65 diesel, 1963 (Good)	2175
65 diesel, 1963 (Good)	2300*
65 diesel, 1963 (Fair)	1800
65 diesel, 1962 (Rough)	1400*
65 diesel, 1962 (Rough)	1475
65 diesel, 1962 (Fair)	1500
65 diesel, 1960 (Fair)	1400*
65, 1958 (Fair)	1650
50 diesel, 1962 (Good)	1900
50 LP, 1958 (Fair)	1250*
35, ldr., 1961 (Fair)	2150*
35 diesel, 1961 (Good)	2200
35, 1959 (Good)	2100*
35, 1956 (Good)	1600
TO30, 1952 (Fair)	825*

FORD-FERGUSON TRACTORS

9N, 1944 (Rough)	525
9N, 1944 (Good)	925
9N, 1943 (Fair)	725

FORD TRACTORS

9000 diesel, duals, 1972 (Good)	5600*
8000 diesel, duals, 1968 (Good)	4600*
8000 diesel, 1968 (Good)	4650
7700 diesel, 1978 (Good)	12,000*
7000 diesel, 1975 (Good)	6300
5000 diesel, 1975 (Excellent)	5600
5000 diesel, 1972 (Good)	4500
5000 diesel, 1970 (Good)	4500
4000 diesel, 1967 (Good)	3200
4000 diesel, 1966 (Good)	3300
4000 diesel, 1966 (Good)	3375
4000 diesel, ldr., 1965 (Fair)	3100
4000 diesel, 1963 (Good)	1600*
3000 diesel, 1968 (Good)	3300
3000, 1968 (Good)	3375
3000 diesel, 1966 (Excellent)	4175*
2000 diesel, 1967 (Good)	3000
2000 diesel, 1966 (Good)	3000
2000, 1963 (Excellent)	2375*
2000, 1963 (Good)	1500
871 diesel, Select-O-Speed, 1958 (Good)	1200
861, 1961 (Good)	1950*
860, 1957 (Good)	2125
850, 1955 (Good)	1800*
841 diesel, 1958 (Fair)	1525
640, 1957 (Excellent)	2600
640, 1955 (Good)	2100*
621, 1960 (Good)	1700*
Sup. Maj. diesel, 1962 (Good)	850

(Continued on page 50)

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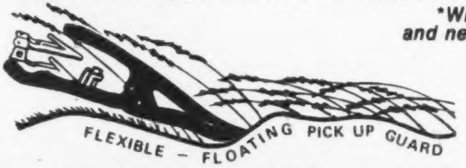
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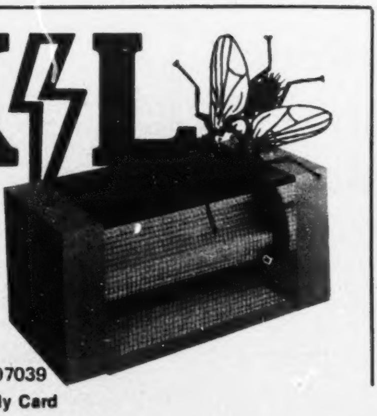

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Auctions

(Continued from page 30)

Dexta, 1959 (Good)	1100
Jub., 1953 (Good)	1500
Jub., ldr., 1953 (Fair)	1250
Jub., 1953 (Good)	1700
Jub., 1953 (Good)	1600
Jub., 1953 (Good)	1650*
8N, 1952 (Excellent)	1375*
8N, 1951 (Good)	1125*
8N, 1951 (Good)	1000*
8N, 1951 (Rough)	750
8N, 1951 (Excellent)	1275
8N, 1951 (Good)	1250
8N, 1951 (Good)	1250
8N, 1950 (Fair)	900
8N, 1950 (Good)	1050
8N, 1948 (Good)	1200
8N, 1948 (Fair)	850
8N, 1948 (Excellent)	1400*

INTERNATIONAL HARVESTER TRACTORS

1586 diesel, 1975 (Good)	9500
1468 diesel, duals, 1974 (Good)	6600
1466 diesel, duals, 1974 (Good)	9500
1466 diesel, 1971 (Fair)	7500*
1256 diesel, 1967 (Fair)	4400
706 diesel, 1967 (Good)	4200*
656, 1971 (Fair)	2700*
424, 1965 (Good)	2200
364 diesel, 1976 (Fair)	2400*
300, 1955 (Rough)	475
284, 1978 (Excellent)	5000*
240, cotton picker, 1961 (Fair)	650
MD, 1948 (Good)	500*
Sup. M, duals, 1953 (Fair)	650
H, 1946 (Fair)	325
C, cult., 1949 (Excellent)	1000
Sup. A, cult., 1950 (Good)	1400
A, har., 1946 (Fair)	700
Cub, mo., 1948 (Good)	975
Cub, cult., plt., plow, 1952 (Excellent)	1750

JOHN DEERE TRACTORS

4630 diesel, 1973 (Good)	12,900*
4430 diesel, 1974 (Good)	12,500*
4430 diesel, 1973 (Fair)	8450*
4240 diesel, cab, 1978 (Excellent)	22,500*
4230 diesel, 1974 (Fair)	7800*
4030 diesel, 1973 (Excellent)	12,500*
4020 diesel, 1965 (Good)	5100*
4020 diesel, 1965 (Good)	5500
3010 diesel, 1962 (Good)	3200*
3010 diesel, 1961 (Excellent)	3675
2030 diesel, 1974 (Excellent)	5000
2020 diesel, 1966 (Good)	4100*
2010, 1965 (Good)	1800
2010 diesel, 1963 (Rough)	800
2010, ldr., backhoe, 1963 (Fair)	1950*
2010 diesel, 1963 (Fair)	1200
1010, 1963 (Fair)	2000
1010, 1961 (Good)	1500*
1010 diesel, 1961 (Fair)	1025*
950 diesel, 1978 (Fair)	3800
430, 1960 (Good)	1200
430, 1958 (Good)	1050
420, 1956 (Good)	1100
310 diesel, ldr., backhoe, 1972 (Good)	8000
300 diesel, ldr., backhoe, 1970 (Good)	3750
300 diesel, ldr., backhoe, 1970 (Fair)	2900*
40, 1954 (Good)	1100
40, 1954 (Fair)	750
40, 1954 (Fair)	875
40, 1954 (Good)	1250
M, cult., plt., 1949 (Good)	825

LEYLAND TRACTORS

384 diesel, 1971 (Rough)	1425
384 diesel, 1971 (Fair)	1750

LONG TRACTOR

560 diesel, (Good)	2700*

KUBOTA TRACTOR

245, (Excellent)	4000

SATOH TRACTOR

S650, (Good)	1825

NOTES

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.

Prices reported are NOT averages.

Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

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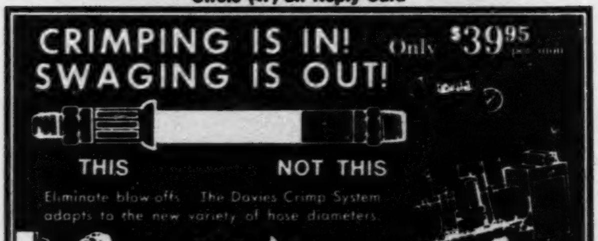
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What are dealers looking for when they consider adding to or changing their product lines?

By Bill Fogarty

"Will it be popular in my area?" got the gold medal, but general product reliability got the most total points.

■WHEN DEALERS are looking for a different franchise, either in addition to or in replacement of one they already have, what are they most concerned about?

In an I&T survey, which was mailed to 3,000 U.S. farm equipment dealers, we put that question forward. We got back 607 usable responses—over 20 per cent—and almost all respondents dealt with it.

We gave dealers six franchise factors to rank in terms of importance to themselves and we left a seventh one blank, offering the dealer a chance to fill in something he might consider important that we had overlooked.

The six factors, in the order they appeared on the questionnaire:

- Sense of personal relationship, fairness.
- General product popularity, suitable to my area.
- General product quality, reliability.
- Adequate trade territory, distribution/allocation.
- Parts, service backup (training, supply system, etc.).
- Counseling in financial, personnel and management concerns.
- Other (please specify).

As for the seventh item, the "other" important consideration, we needn't have bothered. Our six franchise factors seemed to cover it for all participating dealers; none had any to add.

The tallying told us that general product popularity for the trade area was ranked first by a few more dealers than general product reliability. The other factors were ranked as top priority by only one dealer in five.

As a second most important consideration, product reliability was mentioned by the largest percentage of dealers—38.8—and the quality of parts and service backup was ranked second by about three out of 10 dealers. As a third most important factor, parts and service was most frequently mentioned—by one out of three dealers.

While the parts and service backup system is a top consideration for only 8 per cent of respondents, it becomes very significant as a secondary (29.7 per cent) and tertiary (33.6 per cent) consideration. Likewise, the matter of trade territory gets ranked as number one by only 5 per cent of survey participants and as number two by only 10.7 per cent, but it is a rather strong third consideration—25.5 per cent.

The most typical pattern of dealer evaluation is, then, to think first about the general product popularity—its potential sales volume locally—then about its likelihood of giving good service to the customer—i.e., reliability—and then the level of help he is likely to get from the supplier if and when problems develop.

As we looked over the low ratings given personal relationships and a

When dealers consider an additional or replacement product line....

How They Rank (per cent)

Their Main Concerns	First	Second	Third	Weighted Value
General product popularity	42.3	15.9	16.1	174.8
General product reliability	38.1	38.8	12.8	204.7
Parts, service backup	8.0	29.7	33.6	117.0
Adequate trade territory	5.0	10.7	25.5	61.9
Personal relationships, fairness	6.5	4.4	10.7	39.0
Management counseling	0.2	0.4	1.3	2.7

sense of fairness, and to such services as financial counseling, we realized that these considerations, so much talked about over the years at dealer gatherings and so much a part of manufacturers' dealer development programs, are things that come into play at some point after the dealer has established a replacement or additional line to the one he already had.

Our own experience in observing this industry's retail organizations is that the dealer gets most restless when his present supplier (which could be a major, a shortliner or both) is slow in picking up on shifts in demand he sees in his territory. He sees that dealer across the street selling something new—maybe a tillage tool that farmers are finding can tame the local soil, maybe a foreign tractor that fills a horsepower void—and he feels he is losing total market share because his supplier company or companies have nothing comparable in the line. That's when he starts looking more closely at ads in trade magazines and takes an extra walk around the exhibition hall at his association's equipment show, looking for something similar.

But most dealers with much experience in the business know that they could be reaching for trouble if they don't pay very serious attention to product quality concerns. That's why just about as many dealers ranked product reliability number one as product popularity. In fact, if you weight the dealer responses in the survey, giving three points to a first ranking, two points to a second and one to a third ranking, the product reliability concern is greatest—204.7 points compared with 174.8 for product popularity.

If we were to be circulating the same survey among dealers today (we sent it out in September, 1979), we would throw in another consideration for dealers to weigh in looking over new and/or replacement product lines—financing terms. Present conditions in the business are such that we think dealers would rank terms offered as a fairly high consideration. It's a factor that certainly gets a lot of attention in ads to farmers.

Ranking present suppliers

If dealers have their priorities when looking for new or replacement product lines, how do they tend to rank the major suppliers they already have in these same categories?

The same survey asked dealers to rate their major franchisor in seventeen selected categories of varying importance. We gave the dealer respondent three choices on this one—adequate, more than adequate, less than adequate. Here's what they told us:

Consistency of product reliability: More than adequate, 22.8 per cent; adequate, 66.9 per cent; less than adequate, 10.3 per cent. **Quality of components and materials:** (a related concern): More than adequate, 23.4; adequate, 70.1; less than adequate, 6.5.

Suitability of product line for your area: More than adequate, 30; adequate, 63.1; less than adequate, 6.9. **Product's reputation among customers and prospects** (another related concern): More than adequate, 30.3; adequate, 63.0; less than adequate, 6.7.

Parts inventory / supply / delivery

(More...)

NU-WAY™
Traveler-Type Irrigation
The portable irrigation unit with traveling sprinkler-gun, that can be moved from field to field as needed. Nature's rain may not fall when and where you need it, but a Nu-Way can provide your crops with critically needed moisture throughout the growing season.
4 MODELS TO MEET YOUR GROWING NEEDS
"RAIN — WHEN AND WHERE YOU NEED IT"
- Irrigates 23 acres in 24 hours
- Turbine drive or gasoline engine
- Standard, high clearance and grove gun-carts
- Water or slurry application

LONG
LONG MFG. N.C. INC.
P.O. Box [illegible]
Phone: [illegible]

Circle (25) on Reply Card

Dealers' Franchises

(continued)

system: More than adequate, 25.7; adequate, 59.8; less than adequate, 14.5. **Service backup (including training, rep's know-how, responsiveness to problems, warranty handling fairness):** More than adequate, 15.7; adequate, 55.1; less than adequate, 29.2.

The responding dealers, then, seem to have a general level of satisfaction with their suppliers. Only in the last ranking—service backup—do we find fewer "more than adequate" responses than "less than adequate." It signifies that dealers will generally be slow to turn their attention to other product lines for either replacement or supplementing of what they are already selling.

But change they do! The same survey revealed that 35.4 per cent of survey respondents had added or changed product lines in the previous five years. Seventeen per cent had dropped a line and 21.6 per cent had added a line. Another 11 per cent indicated they were considering changing to another line or dropping a present one. □

INDUSTRY IN MOTION

Paul M. Soubry, president, **Versatile Farm Equipment Corp.,** Kansas City, Mo., has announced the appointment of Larry S. Leavelle as manager of sales.

Bomford & Evershed Ltd., manufacturers of pto and boom-type tractor-mounted flail mowers, has appointed Implement Sales Co., Inc., Memphis, Tenn., as its distributor in Alabama, Arkansas, Louisiana, Mississippi and Tennessee.

Robert E. Evensen has been appointed as a sales representative for **Shaver Mfg. Co.,** Graettinger, Iowa.

Claas of America, Inc., Troy, Mich., subsidiary of Claas OHG of West Germany, has announced the appointment of four regional managers for North American combine sales and marketing: W. H. Morris, Southern; Michael R. Synon, Northwest; Jimmy Ray Harris, Central; and Oris L. Miller, North-Central. North American sales will be through selected Ford Tractor dealerships.

The **Gay Hose Corp.,** Niles, Mich., has changed its name to **Polymer Hose & Coupling, Inc.** The company is a subsidiary of The Polymer Corp., Reading, Pa.

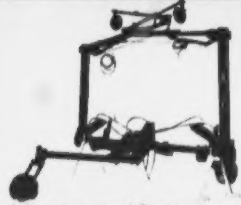
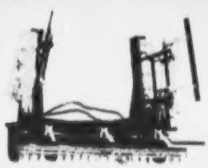
A. Leslie Fitzgerald, Abilene, Texas, has received **Allis-Chalmers'** Distinguished Sales Award for producing the highest percentage of sales gain in total dollar volume for the entire A-C Agricultural Equipment, North American Sales Division.

A newly-formed company, **McCall Industries,** Houston, Tex., has purchased **Lockwood Corp.,** Gering, Neb. Lewis Armstrong, president of Lockwood, and several of the company's vice-presidents are minority stockholders in McCall, which will spend more than $1 million on capital expansion plans.

Michael K. Greenburg has been named president and chief executive officer of **Special Products Co.,** Golden, Colo. He succeeds Rawlen T. Smith who becomes chairman of the board.

ABBOTT

Hitches • Converters • Tool Bars • Row Markers
Seed Bed Conditioners

Over the past 21 years, Abbott hitches with patented features and ingenious Abbott hitch converters have earned a reputation for strength and durability. And we still make these hitches and converters to traditional Abbott standards, but Abbott ingenuity did not stop with hitches. We make tool bars, row markers (both rigid and folding), assist wheels, Do-alls (i.e. a seed bed conditioner which we call a Getz-it-dun), field cultivators (the Agitator), Rolling Wire Baskets -- and we not only make them strong, we continue to incorporate new ideas and patented features. See for yourself -- just look over any implement bearing the big A (including gauge wheels and hydraulic cylinders with or without hose kits), and compare! You'll see why we . . .

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It means **A**ccent on strength and durability.

It has the **A**dvantage of ingenious and common sense design.

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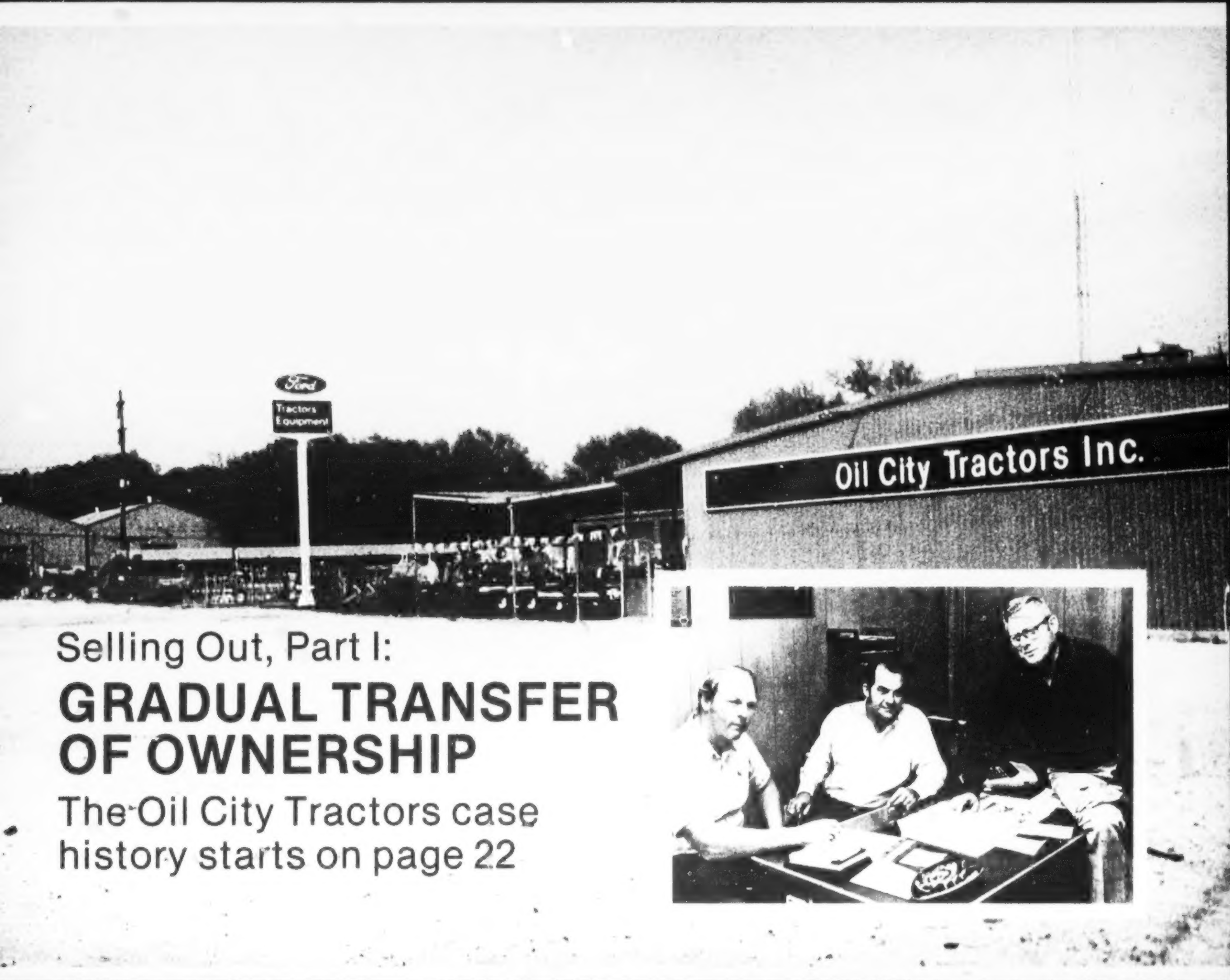
TWO DOLLARS

Implement&Tractor


Ford
Tractors
Equipment
Oil City Tractors Inc.

Selling Out, Part I:

GRADUAL TRANSFER OF OWNERSHIP

The Oil City Tractors case history starts on page 22

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090 091 03 CS21
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SERVIIE/SRI **
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WASHINGTON DC 20014

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INTERTEC PUBLISHING CORP.

May 21, 1981 • Vol. 96 • No. 12

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

10: Old Weighting Habits Are Hard to Break. A study of Nebraska Tests shows that the trend is to tractors that do best at 5 mph/15 pct. slippage. The second of a two-part series on high-speed farming.

22: Gradual Transfer of Ownership at Oil City Tractors. Texas Dealer Charlie Howard developed a plan with key employees whereby they would purchase the dealership over a number of years. Here's how the principals feel about the arrangement after three years. Part I of a series on Selling The Business.

34: Manager, Manage Yourself. The program at the Farm Equipment Manufacturers Assn.'s Spring Management Clinic in San Diego dealt with personal financial management and how to cope with stress.

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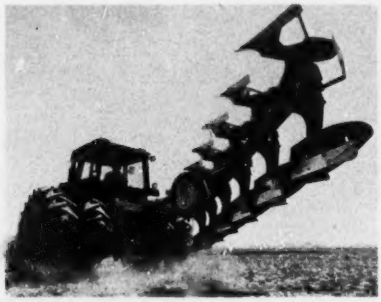
High-speed farming, part II:

Old weighting habits are

Study of Nebraska Test shows that the trend is to tractors that do best at 5 mph/15 pct. slippage. (What happened when the dealer added weights in a competitive deal?)

By Frank Buckingham



■THOUGH some engineers question the necessity and practicality of the Nebraska Tractor Tests for present tractors, the tests do provide means of comparing models under reasonably uniform conditions. Nebraska drawbar tests are conducted on a concrete track, however, which bears little resemblance to field conditions in many seasons.

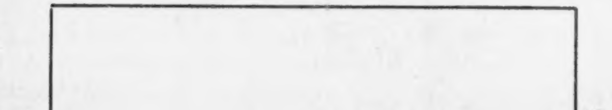
It's also frequently pointed out that farmers don't normally ballast their tractors the way they are weighted at Nebraska. Some load them much heavier, to the chagrin of manufacturers.

One tractor specialist said he had been called to the West Coast shortly after the introduction of a new four-wheel-drive model to investigate repeated drive train failures in one area. Tractors with maximum permissible working weight of 25,000 lbs. were found ballasted to more than 40,000 lbs. to pull large V-subsoilers. After removing excess ballast and some subsoiler shanks, he demonstrated that an equal area could be worked in the same time period at a much higher speed.

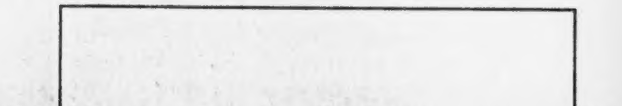
Another tractor specialist recently took exception to this author's statement, in a different publication, that few farmers weight tractors as heavily as those tested at Nebraska. He then described results of a tractor weighing program in which he participated in the Wheat Belt. The average tractor weight as found on farms in some areas was from *3,000 to 6,000 lbs. above the maximum working weight,* based on OSHA standards for ROPS protection.

Old habits are hard to break. But some dealers and farmers in certain parts of the country apparently still

1. Drawbar Power and Fuel Consumption vs. Speed
(93 current 2WD diesel tractors)



2. Average Drawbar Power & Lbs. Drawbar HP vs. Average Speed
(93 current 2WD diesel tractors)



ard to break

base implement selection and ballasting for rubber-tired tractors on experience gained from working crawler tractors—which literally crawled through the field. It is recognized that soil conditions are often different in those areas than in other parts of the country, and some abrasive soils cause rapid tire wear if slippage approaches what would be acceptable limits in other soils.

But exceeding tire load limits with too much ballast may result in equally rapid tire deterioration and premature failure. More careful matching of smaller implements to available power should keep slippage within acceptable limits without reducing field speed to the point of risking premature drive train failure.

Overballasting tractors may also raise some questions of legal liability. If the manufacturer recommends a maximum working weight based on the ROPS design for a particular tractor, who will be held legally responsible if that weight is knowingly exceeded by a dealer when the tractor is sold and the machine is ultimately involved in a serious accident causing ROPS failure? It would probably fall to the courts to determine responsibility. Failure of the buyer and seller to follow established limits could result in placement of blame on those individuals rather than on the manufacturer.

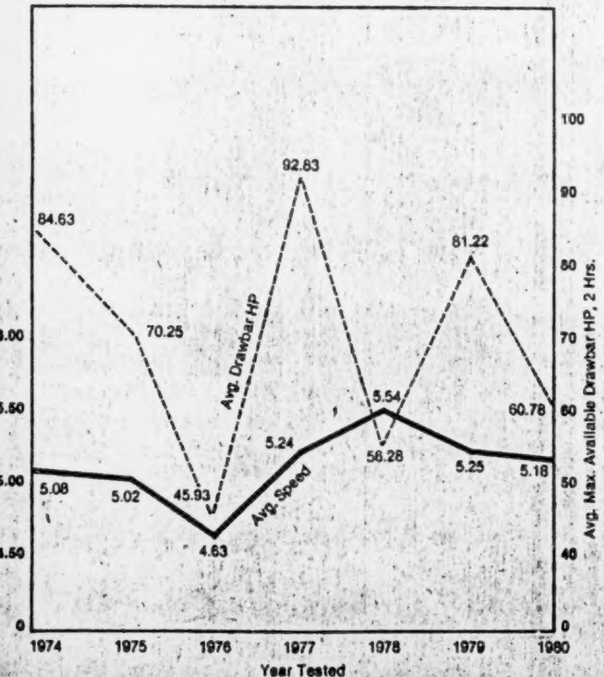
What's happening to tractor weight now?

An analysis was made of Nebraska Tractor Tests for current two-wheel-drive diesel tractors (I&T Red Book, Jan. 31, 1981) tested from 1974 through 1980. The few current models tested prior to 1974 and the limited number with gasoline engines were ignored. All four-wheel-drive tractors listed in the current Red Book were tested in 1976 or later and were evaluated in the same manner.

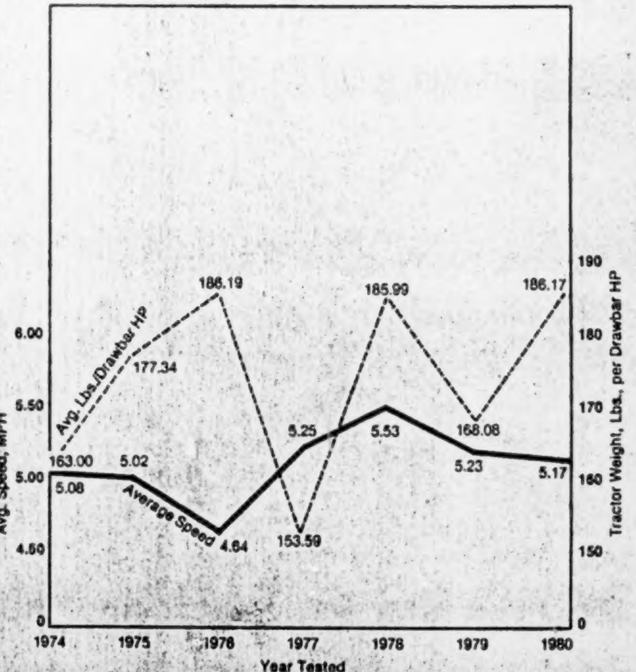
Many engineers compare tractors on the basis of pounds per pto horsepower, but the weight per drawbar horsepower was chosen here because we're looking at operating speed and weight, generally for draft loads, rather than pto performance. Also, because each manufacturer prepares his own tractors for testing and determines the amount of ballast (if any) to use, it is assumed they want those tractors to perform as well as possible and, therefore, equip them accordingly. In addition, the "Maximum Available Power—2 Hours" figure was used rather than plucking the highest drawbar horsepower at-

(More...)

3. Average Speed and Drawbar Power vs. Year Tested (93 current 2WD diesel tractors)



4. Average Speed and Lbs. Drawbar HP vs. Year Tested (93 current 2WD diesel tractors)



tained from any point on the test, as is done in some cases.

For both two- and four-wheel-drive tractors, average fuel consumption in horsepower-hours per gallon (hp-hrs/gal) roughly paralleled average maximum drawbar power as speed increased from about 3.5 to over 6.5 mph. For two-wheel drives, both average fuel efficiency and maximum power tended to *increase* as speed increased up to 5 and 5.49 mph, then *dropped* between 5.5 and 5.99 before again starting upward. Efficiency went from an average of 11.10 hp-hrs/gal for tractors developing maximum drawbar power below 4 mph, to 13.01 for speeds of 5 to 5.49 mph, fell to 12.14 for speeds of 5.5 to 5.99, then climbed back to 12.56 average hp-hrs/gal when speed exceeded 6.5 mph.

On the other hand, average weight (lbs.) per drawbar horsepower followed a directly opposite trend to maximum drawbar power. When average power increased, weight per horsepower declined and vice versa. Similar trends, though not as definite, were evident for four-wheel-drive tractors, too.

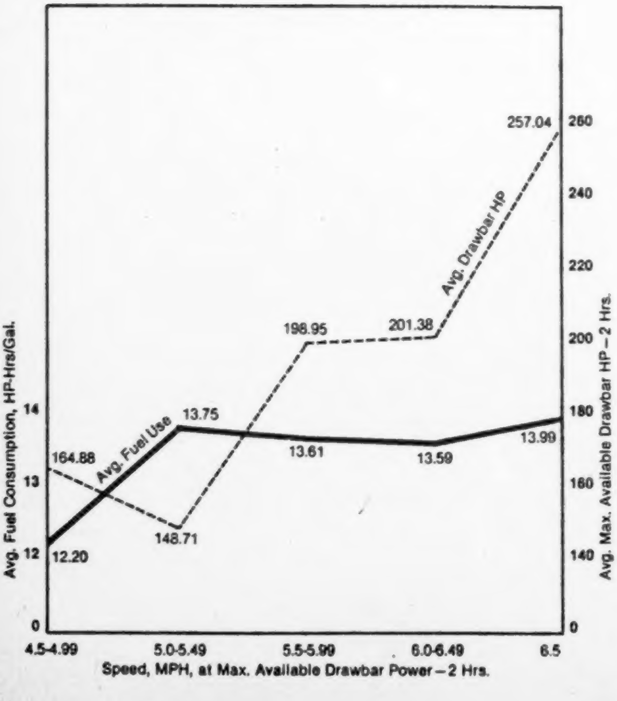
When two-wheel-drive tractors were compared by year of Nebraska Test, 1976 was found to be a slow year. Both average speed and average maximum drawbar power were lower than in any of the other years (1974-1980). A number of smaller tractors still current in 1981 were tested in 1976, and smaller tractors generally have developed maximum drawbar power at lower speeds compared with larger models. But, as with fuel efficiency and drawbar power, the average weight per drawbar horsepower for four-wheel-drives generally increased when power declined and fell when average annual power went up.

The average maximum drawbar power of both two- and four-wheel-drives peaked in 1978 at 92.38 and 237.12 hp, respectively. In that year, average weight per horsepower was lowest for two-wheel drives and highest for four-wheelers. But, the average weight per horsepower of four-wheel drives was within 3.6 pounds—between 146 and 149—in four of the five years studied. Only in 1977 was there a change—down to 135.64 lbs./db hp, the year average speed was highest.

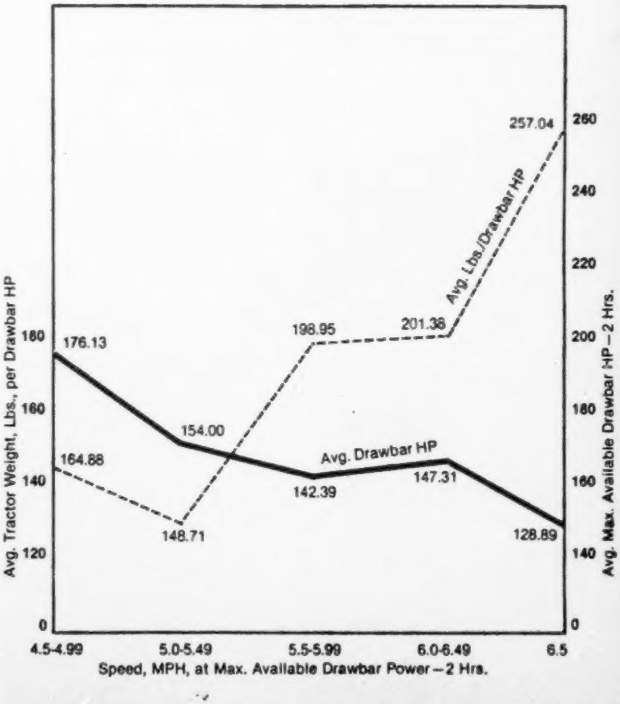
As indicated in the following chart, the weight per drawbar horsepower of two-wheel-drive tractors decreased steadily as power increased. Four-wheel-drives followed the same pattern except for a slightly lower average for tractors between 100 and 140 drawbar horsepower. However, only two

(More...)

5. Drawbar and Fuel Consumption vs. Speed (34 current 4WD tractors)



6. Avg. Drawbar Power & Lbs. Drawbar HP vs. Avg. Speed (34 current 4WD tractors)



current four-wheel-drives fell in this power class, so it is hardly enough to establish a trend.

The average weights were as follows:

Two-Wheel Drive Tractors

Avg. Drawbar Hp.	**Avg. Lbs./Max Db Hp**
40	203.35
40-60	181.76
60-80	168.82
80-100	159.39
100-120	148.74
120-140	143.92
140-160	135.42

Four-Wheel-Drive Tractors

Avg. Drawbar Hp	**Avg. Lbs./Max Db Hp**
100-140	150.67
140-180	166.67
180-220	144.55
220-260	132.22
260	123.23

Summing up

So, what does all this mean to farmers who are buying tractors to operate on soil—loose, firm, dry or wet—rather than on a concrete track?

Simply that most manufacturers are designing and building larger tractors to perform best at speeds of 5 mph or higher with tire slippage between 10 and 15 per cent.

In fact, the operator's manual for most big tractors carries a warning that steady operation with heavy loads requiring use of lower gears may be detrimental to drive train life.

It is uncertain whether manufacturers could or would refuse to honor warranty claims for tractors determined to have been seriously overloaded at low travel speeds. But, threats to that effect have been made by some company representatives.

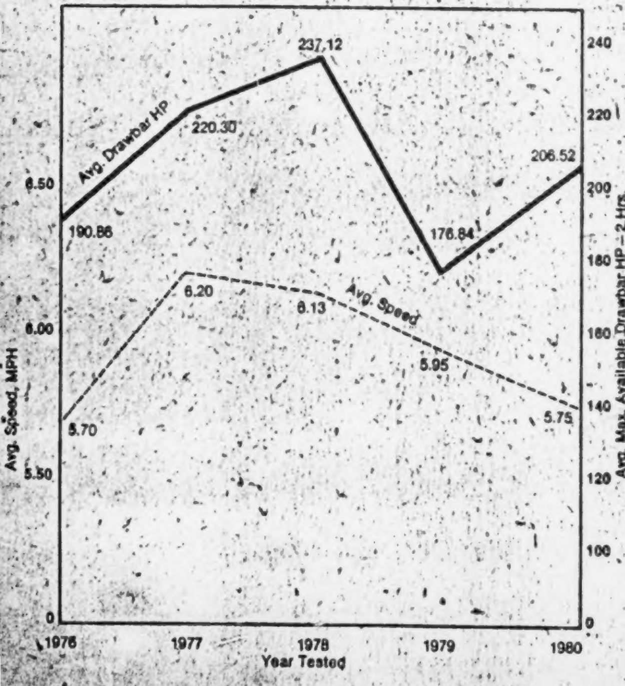
What can the question of speed versus load mean to a dealer?

Equipment sales for some, and nothing for others.

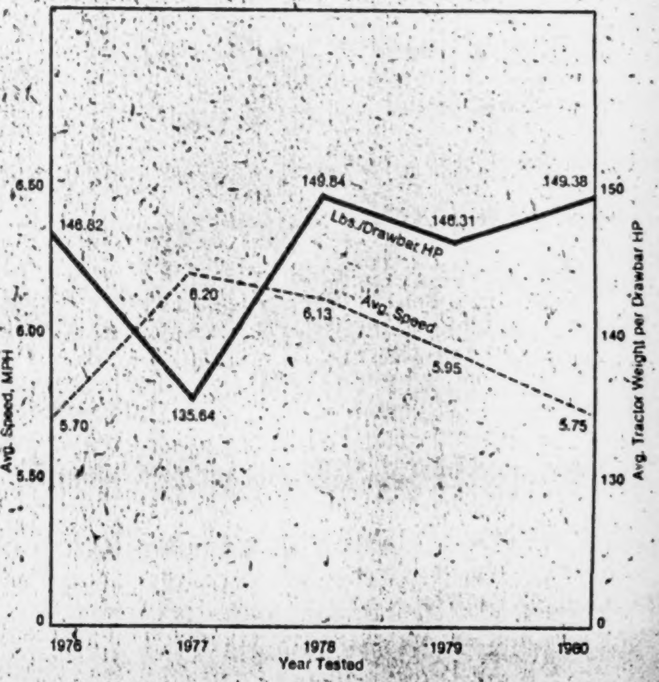
For example, in head-to-head bidding on six tractors for one customer, a dealer found himself outpriced by only $125 per tractor. Examination of the package by company representatives and discussions with the dealer who won the bid showed that the losing dealer had included four sets of rear wheel weights on each tractor—because the other dealer had included them in his bid. It was then pointed out to the losing dealer that his tractors, *without extra weights*, had essentially the same weight per horsepower as the other model with the added weight.

Moral of the story: It requires careful matching of tractors and implements to compete in today's cost-conscious market. Overweighting tractors or oversizing implements may tip sales to the competition. ☐

7. Average Speed & Drawbar Power vs. Year Tested (34 current 4WD tractors)



8. Average Speed & Lbs. Drawbar HP vs. Year Tested (34 current 4WD tractors)



I&T
SINCE 1886

AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

JONES FARM EQUIPMENT CO. Dothan, Alabama (April 14, 1981)

ALLIS-CHALMERS TRACTORS

7080 diesel, cab, (1977) (Excellent)	15,500
7045 diesel, cab, 1978 (Excellent)	15,000*
7040 diesel, cab, duals, 1976 (Good)	11,500*
7030 diesel, cab, 1974 (Fair)	5250*
XT190 diesel, 1971 (Good)	3800*
G, cult., 1950 (Good)	700

CASE TRACTORS

1370 diesel, 1973 (Fair)	6150
1070 diesel, 1974 (Good)	7600
1030 diesel, 1971 (Fair)	4200
680 di[illegible] ldr., backhoe, 1970 (Excellent)	14,500*
580B diesel, 1969 (Good)	5700
430, ldr., 1963 (Fair)	1700
311, 1958 (Fair)	675

DAVID BROWN TRACTORS

1210 diesel, 1971 (Good)	2400*
990 diesel, 1964 (Rough)	575*

MASSEY-FERGUSON TRACTORS

1155 diesel, 1973 (Fair)	8000
1135 diesel, duals, 1975 (Fair)	6600*
1105 diesel, 1973 (Fair)	6100
1085 diesel, 1976 (Excellent)	7100
1100 diesel, 1972 (Fair)	3750
1080 diesel, 1971 (Good)	4600
1080 diesel, 1970 (Good)	4700*
285 diesel, 1975 (Excellent)	6900*
265 diesel, 1975 (Good)	5800*
245 diesel, 1976 (Excellent)	6500
235 diesel, 1975 (Good)	4000
230 diesel, 1976 (Good)	3000
202, forklift, 1962 (Fair)	1450
180 diesel, 1968 (Excellent)	3850
180 diesel, 1968 (Excellent)	3650
180 diesel, 1966 (Good)	3250*
180 diesel, 1966 (Rough)	2350
175 diesel, 1973 (Excellent)	4800
175 diesel, 1972 (Rough)	1900
165 diesel, 1973 (Excellent)	4350
165 diesel, 1967 (Good)	3450*
165 diesel, 1966 (Good)	3550*
165 diesel, 1966 (Fair)	2325
150 diesel, 1969 (Good)	3000
135 diesel, 1974 (Good)	2700
135 diesel, 1969 (Good)	2750
135 diesel, 1966 (Good)	3300
135, 1966 (Fair)	2600*
135 diesel, 1966 (Fair)	2700*
135 diesel, 1966 (Rough)	2300
130 diesel, 1966 (Fair)	1000
65 diesel, 1963 (Good)	2000
65, 1963 (Good)	1950
40, 1956 (Good)	1100
35 diesel, 1961 (Excellent)	2400
35, 1959 (Fair)	1300*
35 diesel, 1958 (Good)	1050*
35 diesel, 1958 (Good)	1250
TO30, 1952 (Good)	1300
TO30, 1952 (Good)	1000*
TO30, 1952 (Good)	1250

FORD-FERGUSON TRACTORS

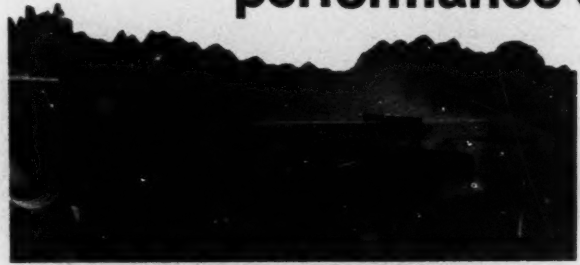
9N, 1946 (Good)	975
9N, 1946 (Good)	1000
9N, 1946 (Good)	1000
9N, 1946 (Good)	950
9N, 1946 (Good)	1050

FORD TRACTORS

8600 diesel, 1975 (Fair)	5100*
8000 diesel, 1972 (Good)	4900
8000 diesel, 1972 (Good)	5350
8000 diesel, 1971 (Good)	4800
7000 diesel, 1974 (Good)	6400
5500 diesel, ldr., backhoe, (Rough)	2500
5000 diesel, 1972 (Excellent)	5225
5000 diesel, 1967 (Fair)	3400
4100 diesel, 1977 (Good)	4250
4100 diesel, 1976 (Good)	4500
4100 diesel, 1976 (Good)	5050
4000 diesel, 1972 (Excellent)	4600
4000 diesel, 1970 (Excellent)	4700*
4000 diesel, 1970 (Good)	3900
4000 diesel, 1970 (Good)	3600
4000 diesel, Select-O-Speed, 1967 (Rough)	1125
4000 diesel, 1963 (Fair)	1400
3000 diesel, 1974 (Excellent)	4700*
3000 diesel, 1973 (Fair)	2850
3000 diesel, 1972 (Good)	3650
3000 diesel, 1969 (Fair)	2600
2000 diesel, 1968 (Good)	2900
2000, Select-O-Speed, 1964 (Rough)	700
2000, 1963 (Excellent)	2800
861, 1960 (Good)	2000
850, 1957 (Excellent)	2250*
850, 1957 (Excellent)	2200
841 diesel, 1961 (Excellent)	2500
820, ldr., 1956 (Good)	1550
641, 1961 (Good)	1975
641, 1960 (Good)	1750
641, 1959 (Excellent)	2350
641, 1959 (Good)	2000
641, 1958 (Good)	2100*
641, 1958 (Good)	2000
641, 1958 (Fair)	1300
640, 1956 (Fair)	1450

(*More...*)

Midland's new generation of land forming equipment gives dependable performance day after day.



Midland 3010 / 3012 / 3014 Box Plane

The new Midland Box Plane incorporates two tools in one. Features include simplicity, precision and maneuverability. The rugged box scraper with its integral rockshaft and draw bar hitch can easily be detached from the frame and used on your tractor for terracing, drainage construction and other utility work.

The box plane is available in blade widths of 10, 12 and 14 feet. The rigid 31 foot frame and steel gauge wheels permit precision leveling with a 70 to 150 h.p. tractors.

Midland Tandem Scrapers

Midland farm scrapers load, carry, dump and spread with one hydraulic lever controlling all operations for each scraper. The scrapers feature all-welded construction, low blade angle for easier loading and the Midland Seal-Set hub. Sizes include 3½, 4½, 6 and 8-yard dolly and straight pole units. 11 and 14-yard push-off type scrapers are available in dolly models.

Midland manufactures the Big Power Line of Disk Harrows, Sub-Soilers, Chisel Plows, Scrapers, Box Scrapers and Land Levelers as well as Pasture Dreams, Zip Seeders, Northcote Precision Drills and Gopher Killers.

Midland Manufacturing Company
Division of Northcote Corporation
Electric Mills, Mississippi 39329 / (601) 476-8401
Telex: 504-156 / Answer Back MMCO ELML

FEMA

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Auctions

(continued)

640, 1956 (Good)	1800*
640, 1955 (Good)	1900
640, 1955 (Good)	1800
Major diesel, 1955 (Good)	850
Dexta, 1959 (Good)	1300
Jub., 1953 (Excellent)	1750
8N, 1952 (Excellent)	1550
8N, 1951 (Excellent)	1500
8N, 1951 (Excellent)	1450
8N, 1951 (Excellent)	1500
8N, 1951 (Good)	1350
8N, 1951 (Good)	1300
8N, 1951 (Good)	1400*
8N, 1948 (Fair)	950
8N, 1948 (Good)	1150
8N, 1948 (Good)	900
8N, 1948 (Fair)	850
8N, 1948 (Good)	1160

INTERNATIONAL HARVESTER TRACTORS

1466 diesel, 1973 (Fair)	6500*
706 diesel, 1964 (Fair)	2800*
706, 1964 (Rough)	2200*
660 diesel, 1961 (Fair)	825
574 diesel, 1973 (Good)	3450*
504 diesel, 1966 (Rough)	1300
B450 diesel, 1957 (Fair)	525*
2444 diesel, 1968 (Good)	2700*
404, 1962 (Rough)	350
H, 1944 (Rough)	125
C, 1948 (Good)	450
Sup. A, 1950 (Good)	925
A, 1940 (Fair)	350
Cub, cult., plt., 1952 (Excellent)	1600
Cub, cult., plt., plow 1952 (Excellent)	1800

JOHN DEERE TRACTORS

4520 diesel, cab, 1969 (Good)	8100
4430 diesel, cab, 1973 (Good)	10,200*
3020 diesel, 1968 (Good)	4300
3010, 1961 (Fair)	2700*
3010, 1961 (Rough)	2000
2630 diesel, 1975 (Excellent)	6100*
2630 diesel, 1975 (Excellent)	6100
2520 diesel, 1970 (Excellent)	6300*
2040 diesel, 1976 (Excellent)	6500
2020 diesel, 1968 (Good)	3900*
2020 diesel, 1968 (Good)	4150
2020 diesel, 1966 (Rough)	1175
2010 diesel, ldr., backhoe, 1964 (Good)	3000
1020, 1966 (Fair)	2550
1010, 1962 (Fair)	1325
830 diesel, 1970 (Good)	4400*
430, 1959 (Good)	1300*
420, 1957 (Good)	1375
60, 1954 (Fair)	450*
40, 1953 (Good)	875*
40, 1953 (Good)	900

LEYLAND TRACTORS

384 diesel, 1970 (Good)	1700

LONG TRACTORS

900 diesel, (Good)	3750
460 diesel, 1976 (Good)	3500*
360 diesel, 1977 (Excellent)	5000*
350 diesel, (Good)	2000

OLIVER TRACTORS

1900 diesel, 1963 (Fair)	2000
1755 diesel, 1972 (Good)	4200*
1650 diesel, 1967 (Fair)	1825

TULLBELT TRACTOR

Cult., plt., mo., (Good)	1900

YODER & FREY, INC.
Archbold, Ohio
(April 13 & 14, 1981)

ALLIS-CHALMERS TRACTORS

7045 diesel, duals, (Good)	15,250
7040 diesel, 1974 (Fair)	11,500*
7040 diesel, 1974 (Fair)	11,000*
7030 diesel, 1972 (Good)	8350*
7030 diesel, 1971 (Fair)	8800*
XT190 diesel,	5800
XT190 diesel, 1955 (Fair)	2935
185 diesel, 1969 (Fair)	7850*
170, 1977 (Good)	5150*
D19 diesel, 1965 (Fair)	2450
D17, ldr., 1963 (Good)	2300
D17, 1961 (Fair)	1750
D17, 1963 (Good)	1425*
CA, plow, cult., 1948 (Fair)	1075
B, mo., 1950 (Fair)	570

DAVID BROWN TRACTORS

1200 diesel, 1965 (Fair)	2475
1200 diesel, 1963 (Fair)	2150
990, 1964 (Fair)	3000*
880, ldr., 1966 (Fair)	2750

DEUTZ TRACTORS

90-06, (Rough)	3025
60-06, (Rough)	1775

CASE TRACTORS

1370 diesel, 1975 (Fair)	10,800
1175,	4975
1030 diesel,	6100
1030 diesel, 1966 (Good)	3900*
930, 1967 (Rough)	1975
930 diesel, 1962 (Fair)	3950
930, 1961 (Rough)	1500
730, 1967 (Good)	2500
700 diesel, 1957 (Fair)	1225
530 diesel,	2225
430 diesel, 1963 (Fair)	2025*

JOHN DEERE TRACTORS

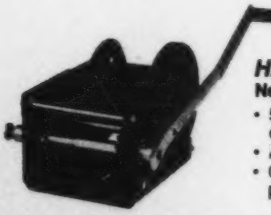
8630 diesel, 1979 (Good)	33,000*
6030 diesel, 1972 (Fair)	17,500*
6030 diesel, duals, 1972 (Fair)	15,300*
5020 diesel, 1971 (Good)	9000
4630 diesel, 1974 (Good)	15,700
4630 diesel, 1973 (Fair)	10,500*
4620 diesel, 1971 (Fair)	9250*
4440 diesel, (New)	30,700
4430 diesel, 1975 (Good)	18,300*
4430 diesel, 1972 (Rough)	13,100
4030 diesel, 1978 (Good)	10,250
4030 LP, 1967 (Fair)	3450*
4020 diesel, 1971 (Good)	9500
4020 diesel, 1970 (Fair)	8100*
4020 diesel, 1970 (Good)	7450
4020 diesel, 1965 (Rough)	5750
4000 diesel, 1970 (Good)	8000*
4010 diesel, 1963 (Good)	4600
4010 diesel, 1963 (Good)	5200*
4010 diesel, 1962 (Fair)	4800
3020 diesel, 1967 (Fair)	5050
3020 diesel, 1967 (Good)	5000
3020 diesel, 1966 (Fair)	4900
3020 diesel, 1966 (Fair)	4250
3010 diesel, 1963 (Fair)	3900*
3010, 1963 (Fair)	2700
3010, 1961 (Good)	3775
2510 diesel, 1971 (Good)	5000
2510, 1970 (Fair)	3425*
2510, 1967 (Fair)	3150
2130 diesel, 1976 (Good)	5700*
2010, 1964 (Fair)	2500*
2010, 1963 (Fair)	2150
830 diesel, 1959 (Fair)	1900*
820 diesel, 1957 (Fair)	2000*
730 diesel, 1958 (Good)	3450
720 diesel, 1957 (Fair)	1875
720 diesel, 1957 (Fair)	1850

(More...)

CHAMPION WEIGHT LIFTERS.

A full line of winches from America's leading manufacturer.
For general farm and utility work:
• Portable conveyors, elevators, grain augers • Grain bin jacks • Bale loaders • Truck davits • Poultry equipment.

NEW WORM GEAR WINCHES
- 6 models: 1500 and 2000 lb. capacities
- Bronze bushings for long life
- Self locking for positive control



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New KX Series
- 5 models: 1000-4000 lb. capacities
- Automatic braking
- Gear covers and two independent ratchets

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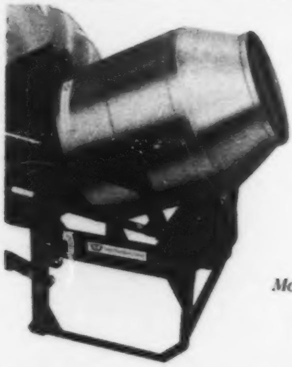

Model 800

Now that's a Worksaver!

Our big 1½ sack Model 800 mixer goes anywhere your tractor can—places big mixers can't. Stop paying for expensive ready-mix, and get a Worksaver that's just your size.

The Model 800 hooks up easily to a 3-point hitch with no brackets needed. The drum rotates continuously, and four big paddles mix as you go. You can even adjust the drum angle for extra control during loading and dumping.

Worksaver designed the Model 800 to save you time and money. We think farmers deserve more of both.

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Auctions *(continued)*

720,	1850
630, 1956 (Good)	2500
620, 1959 (Good)	1800*
70, 1956 (Fair)	1175
70, 1955 (Good)	1675
60, 1954 (Fair)	900
60, 1954 (Fair)	875*
R, 1949 (Fair)	1000*
530, 1957 (Fair)	1450*
520, 1956 (Fair)	1525
520, 1956 (Rough)	1950
430, 1959 (Fair)	2250
40, cult., 1954 (Fair)	1575
MT, cult., 1950 (Fair)	950

FORD TRACTORS

9600 diesel, 1977 (Good)	10,000
9600, duals, 1976 (Good)	11,200
8000 diesel, 1973 (Rough)	5100*
8000, duals, 1969 (Fair)	5500
6000, 1963 (Fair)	2150
6000, 1961 (Fair)	1450
5000, 1971 (Good)	4700
5000 diesel, 1970 (Fair)	3950
4600, 1980 (Good)	7300*
4000,	3850
4000, 1960 (Good)	2100
3600, 1980 (New)	7700*
3000 diesel, 1972 (Good)	4100
3000, 1971 (Good)	3575
2000, 1963 (Fair)	1475
960, 1954 (Fair)	1500
960, 1954 (Fair)	1250
971, 1957 (Fair)	1410
901, Select-O-Speed, 1957 (Good)	1500
900, 1954 (Fair)	1330
801, ldr., 1954 (Fair)	1925
800, 1954 (Fair)	1675
600, 1962 (Fair)	1700
Jub., ldr., 1953 (Fair)	2520
Jub., ldr., 1953 (Fair)	2100
Jub., ldr., 1953 (Rough)	1500
Maj., ldr., 1956 (Rough)	1450
Maj., (Rough)	825
8N, ldr., 1951 (Good)	2160
8N, 1951 (Good)	1400
8N, ldr., 1950 (Fair)	1800
8N,	1050
8N,	900
9N, 1945 (Good)	1500
8N, mo., 1944 (Fair)	1275

INTERNATIONAL HARVESTER TRACTORS

1468 diesel, 1973 (Good)	10,000
1468 diesel, 1970 (Good)	8150
1206 diesel, 1967 (Good)	6350*
1206 diesel, 1967 (Fair)	5400*
1086 diesel, 1979 (Excellent)	18,900*
1066 diesel, 1978 (Good)	15,500*
1086 diesel 1977 (Good)	16,000
1066, hydro,	10,300
1066 diesel, 1972 (Fair)	9900*
1066 diesel, 1972 (Good)	9050
2500, ldr.,	3150
966 diesel, 1973 (Good)	10,750
966, duals,	9600
966 diesel, 1971 (Good)	8700
856 diesel, 1971 (Fair)	7700
826, 1968 (Fair)	5350
806 diesel, 1965 (Fair)	6075
806 diesel, 1965 (Fair)	4800*
806, 1964 (Rough)	3600
766 diesel, 1973 (Fair)	8000*
706 diesel, 1967 (Fair)	3900
706, (Fair)	3000
656, 1967 (Fair)	3700
656, ldr., 1970 (Rough)	3700
560 diesel, 1962 (Fair)	2000
560, 1962 (Fair)	1750
560, 1961 (Fair)	1725
544, ldr.,	4400
460 diesel, 1960 (Fair)	1225
450 diesel, 1957 (Fair)	1175
450, 1957 (Fair)	1150
434, ldr.,	3000
400, 1956 (Fair)	1350
400, 1955 (Good)	1200
350, ldr., 1958 (Fair)	975
340, 1963 (Fair)	1850
300,	975
154, mo., bld.,	3375
154, mo., bld.	2600
100, cult., 1954 (Fair)	2450
Sup. M, 1953 (Fair)	1210
Sup. M, 1952 (Fair)	1100
Sup. M, 1951 (Fair)	1100
M,	800
H, ldr., 1948 (Rough)	675
Sup. A, cult., 1951 (Good)	1700
A, cult., 1950 (Good)	1375
Cub, 1950 (Fair)	1450
Cub, mo., 1949 (Fair)	900
Cub,	820

MASSEY-FERGUSON TRACTORS

2675 diesel, 1978 (Excellent)	15,200*
1155 diesel, 1972 (Good)	8800
1135 diesel, 1976 (Fair)	9750
1100, 1970 (Fair)	3200
1100, 1966 (Fair)	3300*
1080 diesel, 1970 (Fair)	6100
356, ldr.,	2400
230, (New)	7000*
180, 1969 (Fair)	3650*
165 diesel, 1970 (Fair)	3325*
90, 1957 (Fair)	1225
85 diesel, 1958 (Fair)	1600
65, ldr.,	2150
65 diesel,	2050
50, 1962 (Fair)	1800
35, 1952 (Fair)	1550

MINNEAPOLIS-MOLINE TRACTORS

G1000 diesel, 1965 (Fair)	2550
670, 1959 (Fair)	2800

OLIVER TRACTORS

1950 diesel, turbo, 1968 (Good)	5200
1950 diesel turbo, 1967 (Fair)	3500
1850, 1964 (Fair)	3100*
1850, 1963 (Fair)	3500
1850, 1967 (Fair)	3100
1800, 1964 (Fair)	3350
1800 diesel, 1962 (Fair)	3200
1800, 1962 (Fair)	2750*
1800, 1961 (Rough)	2500*
1800 diesel, 1961 (Fair)	2325
1755 diesel, 1969 (Good)	6425
1600, 1962 (Fair)	2575
1600, 1962 (Rough)	2250
77, 1947 (Fair)	585
55 Sup., 1957 (Fair)	1675

WHITE TRACTOR

4-150 diesel, duals, 1973 (Fair)	12,900

VERSATILE TRACTOR

750 diesel, 1978 (Good)	31,000*

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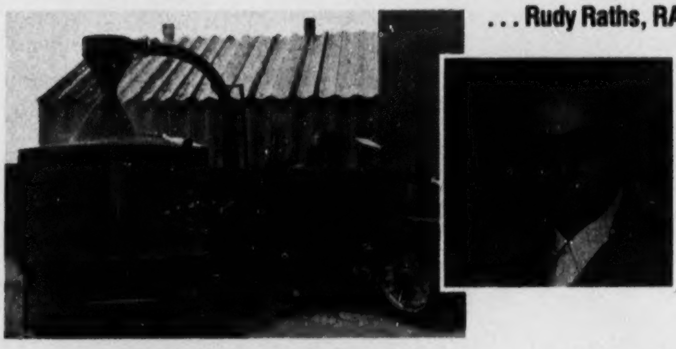
"NEUERO is the best line we've handled in 14 years and gives us the least amount of trouble,"

. . . Rudy Raths, RATHS EQUIPMENT Herman, Minn.



Neuero is the world's oldest and largest manufacturer of portable pneumatic grain conveyors. There are over a dozen models to sell . . . both PTO and self-powered . . . to fit any job.

"If it wasn't for our NEUERO business, our income would have been a lot less," says Rudy Raths. He continued, "There's a Dealer in northern Minnesota who said if it wasn't for acquiring the NEUERO line over a year ago, he couldn't have made it through last summer, since the drouth hit him so hard."

Why NEUERO? "The profits from NEUERO sales are good for us, and the equipment is good for our customers. We have very little service work after the sale. The NEUERO people treat us right and that's important to us. I'd recommend a NEUERO Dealership to anyone. It's a good way to make money and to help your customers reduce their costs and save labor too," added Raths.

NEUERO

NEUERO CORPORATION
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You should be a NEUERO Dealer too! Write or phone for information on the growing profit opportunities available to you. Do it today!

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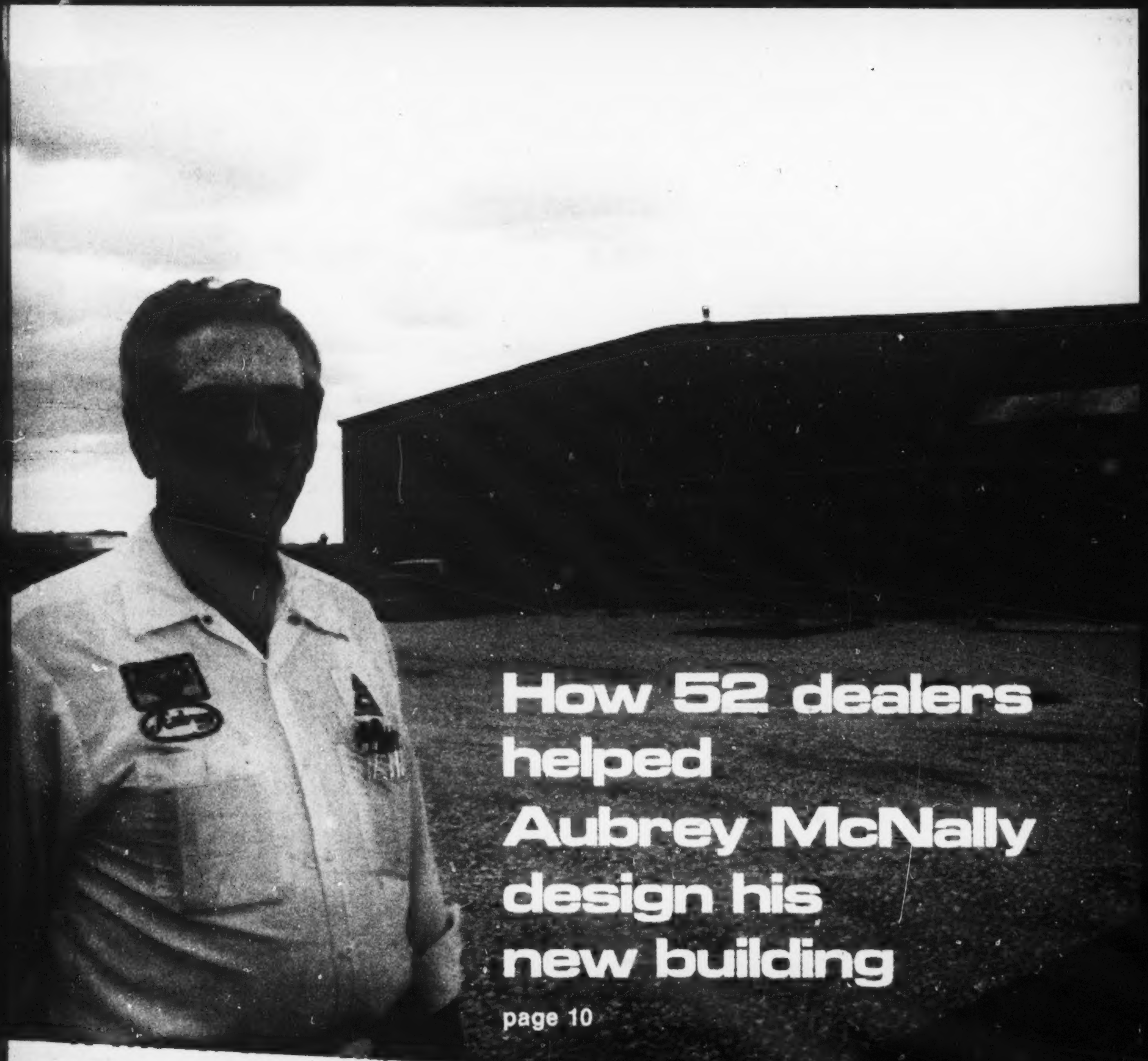

How 52 dealers helped Aubrey McNally design his new building

page 10

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Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

10: How 52 Dealers Helped Design a New Facility. When Aubrey McNally, a long-time Allis-Chalmers dealer, began planning a new facility, he surveyed other dealers and his employees for practical ideas and features.

14: Dealer Chooses Energy Efficient Construction. Dealer Larry Reefman chose a building system utilizing pneumatically placed concrete over an insulating core for his new farm equipment facility.

18: Don't Sell Assets—Sell Income Potential. Donald Koenig, marketing consultant and business broker, offers some guidance to dealers preparing to sell their businesses. Part 2 of "Selling the Business."

22: Inflation and the Value of Used Equipment. Purdue U. and U. of Wisconsin studies deal with depreciation factors in the face of soaring prices.

34: What Will Be the Best Use for Available Water? Water scarcities are demanding and will demand some tough decisions. Here's a look at just one of the ramifications of the problem.

On the cover... Dealer Aubrey McNally stands in front of his new building in McPherson, Kan. Workmen were putting a roof on the front, and paving and landscaping remained to be completed when this photo was taken.

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what's ahead...

I&T
SINCE 1886

June 7, 1981

IT'S PRETTY EXCITING TO SEE A MONTHLY INCREASE IN TRACTOR SALES, as presented by the April flash report of the Farm & Industrial Equipment Institute, until one recalls that this year's April improvement in tractor sales of 14 per cent relates to what happened in April, 1980, when farm tractor sales fell off 47 per cent from the 1979 level of activity. The flash report:

	Unit Retail Sales					
	April			January-April		
	1981	1980	Pct. Change	1981	1980	Pct. Change
Farm Wheel Tractors:						
2-wheel drive						
40-100 HP	6,197	5,398	+14.8	17,473	18,401	- 5.0
Over 100 HP	4,854	4,133	+17.4	13,987	16,689	-16.2
Total 2-wheel dr.	11,051	9,531	+15.9	31,460	35,090	-10.3
4-wheel drive	1,094	1,142	- 4.2	3,411	3,507	- 2.7
Total Tractors	12,145	10,673	+13.8	34,871	38,597	- 9.7
Combines (S-P)	920	1,006	- 8.5	4,739	4,656	+ 1.8
Balers*	563	820	-31.3	2,031	2,152	- 5.6
Forage Harvesters**	272	520	-47.7	994	1,520	-34.6
Mower-Conditioners	862	1,060	-18.7	2,944	3,238	- 9.1

*Bales under 200 lbs. **Shear-bar type.

CANADIAN RETAIL SALES of farm equipment continued strong through the first quarter of 1981, according to a flash report by the Canadian Farm & Industrial Equipment Institute. Farm wheel tractors were up 5.1 per cent to 5,014 units (up 5.6 per cent in March to 1,917). Combines were up 13 per cent to 534 units (up 13.2 per cent in March to 172). Conventional hay balers rose 15 per cent to 294 units (24 per cent more for March at 118 units). Mower-conditioners jumped 30 per cent to 350 units (up 26 per cent in March to 161). Why the difference between the strong performance in Canada in the first quarter and the weak sales picture in the U.S. during the same period, with tractor volume off 16 per cent?

According to Robert Mercer, editor of a couple of Canadian agriculture newsletters, farmers in Western Canada know they are going to get some good prices for their grain. "The bins are empty," he said, and they have cash in their pockets. Bill Armstrong, manager of the Alberta-British Columbia Farm Equipment Dealers Assn., noted that dealers and farmers in the west had a strong year in 1980 and prospects for 1981 look good. "Dealers are going like mad," he added. Glenn Peart, executive director of the Ontario dealer group, said farm prices have been reasonably strong this spring, and farm equipment purchases have been "better than expected."

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Bill Fogarty

What Will Deere Be Doing in 1984?

For inveterate industry watchers, here are some of the more absorbing estimates to come out of a report on Deere & Co. by Sanford C. Bernstein & Co., a New York investment firm. Let's see what you think of them:

In 1980, Deere captured 27 per cent of the U.S. and Canadian farm wheel tractor market, both two- and four-wheel drive, including the under-40-hp units that came in from Japan. Jerry Anderson, the Bernstein analyst who did the study, estimates the horsepower groups thus:

Under 40 hp: Deere's share, 13 per cent; **40-79 hp:** 21 per cent; **80-99 hp:** 45 per cent; **100-139 hp:** 40 per cent; **over 140 hp:** 40 per cent; **total two-wheel-drive tractors:** 27 per cent; **four-wheel-drive tractors:** 26 per cent. Deere is estimated to hold about 28 per cent of the market in the U.S. and 21 per cent in Canada.

For 1984, the study estimates that Deere will hold its share of each horsepower segment of the North American market or strengthen itself by a percentage point or two, resulting in a solid 28 per cent of both the two-wheel and four-wheel-drive tractor markets. The 1984 estimate is also for a much stronger year for the industry in unit sales than we had last year—235,000 compared with 190,000 (again, including low-horsepower units from Japan, Canadian sales, etc.).

The Bernstein report estimates that Deere shipped 37,506 units last year from its Waterloo Tractor Works. Here's how it is broken down by model numbers: **2440**—2,060 units; **2640**—2,725 units (both of these models actually originate at Deere's Dubuque Works); **4040**—2,203 units; **4240**—5,722 units; **4440**—12,053 units; **4640**—5,624 units; **4840**—3,196 units; **8440**—1,669 units; **8640**—3,196 units.

In 1984, the Bernstein study estimates, Deere will be shipping 48,175 tractors from Waterloo, including about 110 of a four-wheel drive tractor carrying about 275 pto horsepower.

Shares of market. The study provides an estimate of shares of the U.S. market by each of the major North American companies for 1979. (Having 1980 share estimates would be even more interesting, but would involve the distortions related to International Harvester's six-month strike.) Here are two-wheel-drive tractor share estimates:

Company	**40-79 HP**	**80-99 HP**	**100 + HP**	**Total**
Allis-Chalmers	2%	2%	2%	6%
J I Case	3	3	2	8
Deere & Co.	14	14	7	35
Ford Tractor	9	2	0	11
Int'l. Harvester	8	7	4	19
Massey-Ferguson	9	1	1	11
White Farm	2	2	1	5
Other	4	1	0	5
Total	51%	32%	17%	100%

Here's how the four-wheel-drive market worked out that year, according to the study: **Allis-Chalmers,** 7 per cent; **Case,** 14 per cent; **Deere,** 29 per cent; **Ford,** 1 per cent; **International Harvester,** 18 per cent; **Massey-Ferguson,** 2 per cent; **White Farm,** 5 per cent; **Versatile,** 8 per cent; **Steiger,** 16 per cent.

Some industry executives we know have seen these figures and agree that they are generally on target, with some exceptions. In the 40-99 hp group, for example, Massey is thought by some to have a broader share of the market.

Combine activity. Jerry Anderson first sets out the changing market mix in North American combine demand, *i.e.,* there is a decline in demand for smaller sizes (FIEI Classes II and III) and a movement toward the larger models (VI and VII). In 1980, North American farmers bought 6,800 Class II and III types, 10,900 Class IVs, 11,600 Class Vs, and 4,300 VIs and VIIs. Total—33,600. By 1984, they'll be taking, the Bernstein report estimates, 5,100 IIs and IIIs; 10,200 IVs, 11,800 Vs, and 8,300 VIs and VIIs.

How much of this business was/will be in rotaries? The study estimates that rotary types, which had 1 per cent of the market in 1976, grew to 17 per cent in 1978 and 30 per cent in 1979, fell back to 25 per cent in 1980 due to the IH strike, and will constitute 43 per cent of the business in 1984.

Here's how the North American combine market shares for 1979 and 1984 are estimated by Bernstein's Anderson:

Company	**1979 Share**	**1984 Share**
Deere & Co.	29%	32%
Int'l. Harvester	18	18
Massey-Ferguson	19	18
Allis-Chalmers	19	22
New Holland	9	7
White, others	6	3

The Bernstein study sees Deere keeping its penetration around the 32 per cent level through

(More...)

Editor's Notebook *(continued)*

1984, but more of its share is expected to come from the smaller size classes and less from the larger, higher-ticket classes: In 1979—47 per cent of the VIs and VIIs; in 1984—17 per cent of them.

Market strategy. If the Bernstein/Anderson estimates and projections are on target for combines, why will Deere be sitting tight with its line of conventional combines? Anderson suggests this scenario:

"We are convinced that Deere will introduce a rotary, but not until after 1984, *i.e.*, until the domestic agricultural equipment market goes into its next cyclical decline. The negative factors likely to affect the company's construction equipment and overseas operations in both fiscal 1981 and 1982 suggest that management will be concerned with protecting total corporate earnings and cash flow. To do so entails maintaining effective capacity utilization at the Harvester works without undertaking either the cost burdens or the other disruptions entailed in bringing out a major new product."

If that sounds like bad news for Deere, read on: "The delay will benefit Deere in that it will provide sufficient time to improve its existing rotary combine prototype and gather more data on customer acceptance, leaving its competitors to struggle with problems of wet harvesting seasons and design considerations such as rock ingestion....

"In the post-1984 period, we believe that Deere and perhaps Allis-Chalmers will adopt what we consider to be the optimal strategy—marketing the combination of rotary combines in the larger size classifications and conventional machines in the lower classifications."

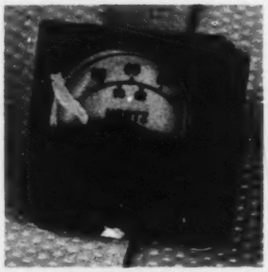
Major conclusion. The bottom line of the Bernstein research report is that Deere's per-share earnings should rise to $8.50 in fiscal 1984 (vs. $4.90 in 1979 and $3.59 in 1980) for a peak-to-peak growth rate of about 12 per cent annually.

On the way to this position, says the report, Deere's overseas operations will return to profitability, there will be above-average earnings growth in North American construction and industrial product lines, and below-average earnings growth in North American farm equipment operations, especially combines, implements and

(Continued on page 50)

WHAT'S NEW

Frequency Meter Is Portable, Economical



Electro Specialties, Inc. has introduced its model 12-60 portable frequency meter with a range of 55 to 65Hz over an 80- to 150-volt scale. The 2-in.-cube meter fits into any 120-volt outlet and has an ABS plastic case that protects it from shocks and jolts.

Circle (135) on Reply Card

Wider Rakes From Avco Provide Smoother Action

Two 9½-foot rakes from Avco New Idea are designed with suspended baskets in order to reduce bounce, increase raking efficiency and keep teeth from breaking. The rakes feature sealed bar bearings, offset drive wheels and positive belt drive. The left-hand version, model 406, and right hand version, model 407, can be teamed with a model 410 dual hitch for double windrowing.

Circle (136) on Reply Card

Hedlund Scavenger Throws Manure Up To 50 Feet

Hedlund's Scavenger manure spreader uses a series of staggered 7- by 10-in. paddles, turning at a slow speed, to break up solids and move material forward to the expeller. Because of this design, the Scavenger can spread all types of manure from liquid to partially frozen. The 18- by 30-in. reel expeller, mounted on the side of the V-shaped tank, turns at 750 rpm to chop material finer and throw it as far as 50 ft. Four models are available with struck level capacities from 167 to 282 bu.

Circle (137) on Reply Card

(Continued on page 25)

certain ancillary product lines.

The study is loaded with many additional, and fascinating, tabular estimates concerning such stuff as operating profit margins of specific factories, net sales of Yanmar-sourced tractors, consumer product revenue, etc., but space here is limited.

Besides, Bernstein & Co. is hoping to sell copies of the report at $300 each. If you're interested, contact them at 717 Fifth Ave., New York, NY 10022. (Telephone 212/486-6780 and talk to Kevin Brine.)

How does Deere & Co. feel about the Bernstein study? I&T asked if the company had any remarks to make about it, but a spokesman informed us that Deere policy is not to comment on such reports.

Meeting Other Dealers: Atlanta's Your Best Bet

Probably nowhere else can you find a greater concentration of dealers with smarts than you can at annual conventions of the National Farm & Power Equipment Dealers Assn. That doesn't necessarily mean you'll find only the biggest volume dealers, though many of them show up at NFPEDA. It means that the dealers there are generally in search of the latest in retail management thinking, and they generally find it by talking with colleagues from all over North America.

According to Jim Whitfield, NFPEDA convention director, there will be three workshops aimed at providing dealership management help when NFPEDA convenes Aug. 16-19 at the Hilton Hotel in Atlanta, Ga. They are: (1) TI 990 and Hybrid Parts Inventory System and Accounting, by James Arnold, the association's director of management services; (2) Product Merchandising and Promotional Display, by James Gray of the National Retail Hardware Assn.; (3) How the LIFO Inventory System Can Work for You, by W. J. De Filipps, CPA, consultant.

Other programmed business will include talks by John Phillips (Lilliston), chairman of the FIEI; Lloyd Summa, current NFPEDA president; James Kilpatrick, the eloquent syndicated columnist; Charlie Plumb, former Vietnam War P.O.W.; and John Mullenholz, NFPEDA's new Washington legislative counsel.

NFPEDA provides the only family-oriented convention in the industry. Since the mid-1960s, dealers have been bringing the wife and kids to this event to combine some pleasure with business. There are always outings available for the family—this time, for example, there's an all-day adventure at Stone Mountain—and parties for young people and smaller children, in addition to a banquet for the entire group that includes entertainment.

Another bonus for the attending dealer: The major companies of the industry have receptions and/or dinners for their dealers, and the top marketing brass of each company are on hand. You

exchange views and ask questions. Of course, if the top marketing executives don't show up, leaving the matter to secondary echelons, maybe that answers one of your questions.

If you can't make it this August, maybe the location of the 1982 convention will interest you: Honolulu.

Major Introduction By International Harvester?

On the cover of International Harvester's summary of its annual stockholders' meeting (not to be confused with their annual report), we saw an interesting teaser: "IH will introduce 51 new products in 1981."

President Warren Hayford's comments inside touch on some already-introduced items such as the 786 tractor and the Earth Metal tillage line. Then he adds: "And during 1981, the Ag Equipment Group will introduce a major advancement in *new tractor models* that will substantially increase the productivity of farmers throughout the world." *(Italics ours.)*

Who Are the Big Spenders In Farm Equipment Advertising?

Every year, *Agri Marketing,* a specialized publication for agribusiness advertising and marketing executives, reports the results of research carried out by Agricom, St. Joseph, Mo., which estimates how much money was spent on advertising in agricultural print media to reach farmers, and by whom.

In 1980, who were the big 10? Most of them were chemical companies, led by Monsanto, then Elanco, American Cyanamid, Ciba-Geigy, Stauffer, Union Carbide and DuPont. Among machinery companies were Deere—third, spending $4.3 million—and IH—fifth, at $3.8 million, probably including trucks. Ford Motor was ninth, spending $2.57 million, presumably divided between tractors, autos and trucks.

Other farm equipment companies among the leaders:

Sperry New Holland—11th, $2.2 million; J I Case—21st, $1.38 million; Massey-Ferguson—23rd, $1.28 million; Allis-Chalmers—25th, $1.20 million; White Farm—29th, $1.03 million; Hesston—35th, $789,245; Avco New Idea—42nd, $686,304; Gehl—53rd, $505,750; Kubota—56th, $472,369; Long—58th, $463,952; Bush Hog—68th, $394,066; Caterpillar—73rd, $352,452; Kewanee—83rd, $298,559; Farmhand—95th, $268,121; Deutz—98th, $258,641; Vermeer—100th, $247,643; McDonough—$225,102; Versatile—127th, $190,831; Steiger—136th, $174,242; Brillion Iron Works—140th, $169,077; Lilliston—144th, $164,635.

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Implement & Tractor

Service Feature

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Crimping and Swaging page 10

FIEI Market Forecast Update page 14

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June 21, 1981 • Vol. 96 • No. 14

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

Service Feature

Help With Hydraulics

8: Five Ways to Deal With Fluid Contamination. The largest single cause of hydraulic systems malfunctions is contamination. Here are some methods to prevent it.

10: Do Hydraulic Hose Fittings You've Repaired Pop Off? The manufacture of hydraulic hose to closer diameter tolerances may require use of smaller ferrules and dies for swaging or a change to use of a crimping machine.

14: Market Optimism — Down, But Not Out. An update of the Farm & Industrial Equipment Institute's January outlook for the year may mean a lot of our troubles are behind us.

18: Finding a Buyer. A review of several types of services available to help the seller of a business. Part 3 of "Selling the Business."

20: End of a Dream. A young couple's dream of business ownership is cut short by many factors that confront farm equipment dealers today.

On the cover... Jeff Dunkin, left, of Olathe (Kan.) Ford Tractor, demonstrates use of a crimping machine for hydraulic hose fittings. Dave Whitham, top right, J I Case engineer, demonstrates a portable filter pump.

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RETAIL SALES OF WHEEL TRACTORS*

(In Units)

	Total Wheel Tractors†				Cumulative for Jan.-Mar., 1980				Cumulative for Jan.-Mar., 1981			
	Mar. 1980		Mar., 1981		Farm Type				Farm Type			
	Farm	Non-Farm	Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm
Alabama	291	49	166	33	666	28	694	108	374	13	387	66
Alaska	2	....	2	2	3	....	3	2	6	....	6	13
Arizona	69	36	70	33	217	22	239	132	183	19	202	87
Arkansas	389	49	279	46	842	113	955	132	714	118	832	82
California	480	319	437	223	1,039	72	1,111	710	973	88	1,061	567
Colorado	118	56	127	51	214	49	263	166	255	53	308	121
Connecticut	10	17	23	14	40	....	40	51	34	1	35	33
Delaware	15	2	11	....	40	3	43	7	30	1	31	9
Florida	195	121	195	107	563	20	583	325	550	13	563	275
Georgia	352	58	276	53	899	20	919	112	656	9	665	124
Hawaii	2	5	11	9	12	....	12	34	17	3	20	18
Idaho	107	15	228	19	236	21	257	39	338	61	399	51
Illinois	387	78	472	66	1,327	182	1,509	196	999	202	1,201	166
Indiana	299	45	227	31	688	127	815	127	515	90	605	84
Iowa	497	33	518	18	1,681	156	1,837	70	1,332	158	1,490	43
Kansas	341	42	211	39	721	129	850	98	482	127	609	72
Kentucky	364	38	329	78	936	22	958	79	840	12	852	145
Louisiana	332	74	271	94	669	86	755	151	609	74	683	170
Maine	8	19	23	5	35	2	37	31	46	1	47	18
Maryland	78	32	32	51	161	17	178	66	93	9	102	93
Massachusetts	5	26	4	32	25	....	25	64	23	....	23	62
Michigan	164	101	164	71	506	48	554	213	420	74	494	165
Minnesota	411	57	418	26	846	141	987	104	862	150	1,012	74
Mississippi	411	28	268	29	913	88	1,001	77	583	70	653	77
Missouri	407	61	283	48	968	78	1,046	154	623	70	693	105
Montana	97	17	77	14	227	58	285	46	167	47	214	36
Nebraska	429	19	289	11	1,042	114	1,156	52	670	75	745	37
Nevada	13	14	14	12	23	4	27	33	28	....	28	24
New Hampshire	10	8	2	4	24	....	24	18	10	....	10	18
New Jersey	29	45	26	27	68	....	68	116	56	....	56	78
New Mexico	26	22	39	23	86	7	93	53	85	10	95	70
New York	156	69	167	67	442	19	461	192	395	33	428	167
North Carolina	338	59	275	44	802	13	815	163	713	11	724	126
North Dakota	175	8	196	4	331	169	500	17	323	192	515	13
Ohio	385	87	280	71	893	93	986	204	636	86	722	170
Oklahoma	237	64	163	69	534	78	612	139	363	56	419	177
Oregon	91	63	73	28	257	14	271	127	198	25	223	79
Pennsylvania	217	98	167	73	491	16	507	271	402	19	421	185
Rhode Island	....	9	....	6	4	....	4	15	2	....	2	13
South Carolina	164	32	99	32	400	15	415	79	271	6	277	76
South Dakota	177	14	136	6	397	66	463	27	311	66	377	16
Tennessee	308	54	231	39	754	25	779	100	565	21	586	86
Texas	732	411	712	407	2,316	152	2,468	907	1,891	122	2,013	853
Utah	49	47	44	47	102	3	105	94	157	9	166	74
Vermont	14	1	25	8	46	....	46	3	59	....	59	11
Virginia	199	84	148	40	503	7	510	181	323	5	328	112
Washington	166	40	137	31	370	29	399	96	289	50	339	63
West Virginia	21	19	31	12	77	....	77	31	65	....	65	37
Wisconsin	400	65	374	43	925	52	977	129	740	59	799	96
Wyoming	19	25	44	13	55	7	62	48	83	9	92	52
U.S. Government	2	39	3	14	26	....	26	251	4	....	4	32
Miscellaneous‡	33	8	9	30	117	....	117	166	46	....	46	116
TOTAL	**10,221**	**2,782**	**8,806**	**2,354**	**25,559**	**2,365**	**27,924**	**6,806**	**20,409**	**2,317**	**22,726**	**5,544**

Data released May 21, 1981, Farm & Industrial Equipment Institute.

*Figures do not include garden tractors. motor tillers or contractors off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland, Satoh); Allis-Chalmers; Belarus; J I Case; Deere; Deutz; Ford; International Harvester; Long; Massey-Ferguson; R. M. Wade (Satoh); Steiger; Versatile; and White.

†The monthly sales are those reported for that month only. The cumulative totals are subject to revisions reflecting updating in the basic sales data.

‡Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

State-of-the-Industry 1981 Forecast Update:

MARKET OPTIMISM—DOWN, BUT NOT OUT

The outlook isn't as bright as it was in January, but it may mean that a lot of our troubles for the year are behind us. The big if: interest rates.

By Bill Fogarty

Cecil Stralow (Avco New Idea) delivered the report of the consensus forecast to the Marketing & Management Conference of the Farm & Industrial Equipment Institute. Figures in the forecast reflect the median response range of 49 producers of field machinery and 47 manufacturers of farmstead equipment. Respondents dealt only with products they manufacture and sell, and were asked to predict on an industry-wide basis, rather than individual company outlooks.

■EXPECTATIONS about the farm equipment industry's performance in 1981 compared with 1980 have come down, as indicated by the State-of-the-Industry update forecast delivered at the Marketing & Management Conference in late May. (The event is a function of the Farm & Industrial Equipment Institute.)

However, in view of the generally disappointing results noted in the first three and four months of 1981, the group's expectations are apparently for a fairly strong finish.

In other words, if tractor sales are off by 9.7 per cent through April of this year, compared with last year, and the expectation is for an improvement of 2.4 per cent, then the last eight months of the year should show great strength. Either that, or industry forecasters have overshot the mark again.

If they have, a principal culprit will be interest rates. In January, the group was expecting the prime rate to get down to 13 per cent by August. And in May, the rate was up around 20. When surveyed in April, participants in the outlook survey were of the opinion that the prime would hit 13 or 14 per cent by August or September.

Said Cecil Stralow (Avco New Idea): "Key factors influencing the less optimistic outlook include reduction in government support programs, continued rising inflation, high interest rates, low farm prices, low soil moisture and a strong potential for drought." Stralow presented the results of the group survey at the conference.

"Those who thought business may improve," he added, "listed these reasons: aggressive industry pricing actions, possible lower interest rates by harvest time and a pent up de-

SALES BACKGROUND, SALES OUTLOOK

(Retail sales of units, United States)

	Recent History		Forecasting 1981			
			In January		In May	
Product	1979 Actual	1980 Actual	Unit Sales	Pct. Change From 1980	Unit Sales	Pct. Change From 1980
Tractors						
Under 40 HP	49,297	46,742	47,000	+ 0.6	46,100	- 1.5
40-99 HP	65,002	58,191	61,500	+ 5.7	59,000	+ 1.5
100 HP and over	62,535	50,332	59,000	+ 17.2	52,442	+ 4.2
Four-Wheel Drive	11,455	10,886	11,600	+ 6.6	11,500	+ 5.6
Total	188,289	166,151	179,000	+ 7.7	170,100	+ 2.4
S-P Combines	32,246	25,722	29,500	+ 14.7	28,700	+ 11.5
Cornheads	22,374	17,785	19,400	+ 9.1	19,984	+ 16.5
Field Cultivators	16,951	14,500	16,775	+ 15.7	14,333	+ 5.0
Chisel Plows	15,345	14,000	15,250	+ 8.9	13,500	+ 12.7
Disk Harrows	63,185	51,800	57,500	+ 11.0	48,100	+ 3.7
Moldboard Plows	31,743	24,000	25,500	+ 5.3	24,000	- 0.4
Conventional Balers	18,750	14,005	14,750	+ 5.3	14,000	- 0.2
Big Balers	21,351	16,453	19,000	+ 15.5	18,000	+ 9.5
Mower-Conditioners	25,600	19,449	21,050	+ 8.2	20,500	+ 5.4
Forage Harvesters	12,451	9,453	10,650	+ 12.7	9,802	+ 3.6
Windrowers/Swathers	8,918	7,100	8,140	+ 14.6	7,500	+ 6.0
Cotton Strippers	1,774	1,650	1,950	+ 10.2	(not provided)	
Manure Spreaders	18,103	14,000	17,000	+ 21.4	15,249	+ 3.5
Grinder-Mixers	11,673	8,500	9,000	+ 5.9	8,300	- 2.0

Source: Farm & Industrial Equipment Institute, May, 1981.

AGRI-EQUIPMENT FORECASTS, 1981
(Per cent change, retail dollar volume)

Product	Jan., 1981	May, 1981
Portable augers, elevators	+ 5.0	0.0
Bin-type crop dryers	+ 2.0	0.0
Batch, continuous-flow dryers	+ 5.5	- 5.0
Farmstead equipment, dairy, beef	+ 5.0	0.0
Farmstead equipment, hogs	+ 10.0	+ 3.0
Grain bins	+ 3.5	- 5.0
Milking machines	+ 6.0	0.0

Source: Farm & Industrial Equipment Institute

mand for many products."

The FIEI's report on its spring outlook survey sums up: "All in all, the State of the Industry Update indicates manufacturers believe it will take most all of 1981 to recover from last year's precipitous declines in retail sales. They see any real turn-around being moved well into 1982."

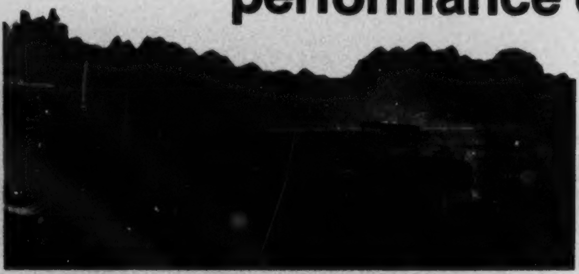
Long-range shifts

One part of the survey asked participants what they consider to be the important impact of the need to conserve energy and water on the farm. Respondents said:

"We see increases in solar energy for grain drying, heating farm buildings, use of animal waste for fertilizer and fuel...more use of alcohol as fuel"..."Reduced tillage, more minimum till"..."Acceptance of wind power back on the farm"..."More fuel-efficient engines for field equipment, new revolutionary fuels and engines"... "Changes to crops less sensitive to dry conditions"..."More water-conservative, low-pressure, energy-efficient irrigation equipment"... "Return to dry land farming in many areas of the High Plains as cost of lifting water prohibits irrigation..."

Said the FIEI report: "Often mentioned and underlying in many replies is the emergence of a new attitude. FIEI members predict farmers in many areas will see the end of the 'more is better' era. They think farms reach points of diminishing returns and that an age of 'optimum' agricultural production yielding the maximum level of profitability considering farm size and the costs of energy, water and many other variables will prevail." ☐

Midland's new generation of land forming equipment gives dependable performance day after day.



Midland 3010 / 3012 / 3014 Box Plane

The new Midland Box Plane incorporates two tools in one. Features include simplicity, precision and maneuverability. The rugged box scraper with its integral rockshaft and draw bar hitch can easily be detached from the frame and used on your tractor for terracing, drainage construction and other utility work.

The box plane is available in blade widths of 10, 12 and 14 feet. The rigid 31 foot frame and steel gauge wheels permit precision leveling with a 70 to 150 h.p. tractor.

Midland Tandem Scrapers

Midland farm scrapers load, carry, dump and spread with one hydraulic lever controlling all operations for each scraper. The scrapers feature all-welded construction, low blade angle for easier loading and the Midland Seal-Set hub. Sizes include 3½, 4½, 6 and 8-yard dolly and straight pole units. 11 and 14-yard push-off type scrapers are available in dolly models.

Midland manufactures the Big Power Line of Disk Harrows, Sub-Soilers, Chisel Plows, Scrapers, Box Scrapers and Land Levelers as well as Pasture Dreams, Zip Seeders, Northcote Precision Drills and Gopher Killers.

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Division of Northcote Corporation
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FEMA

Circle (4) on Reply Card

RETAIL SALES OF SELECTED FARM EQUIPMENT — Jan.-Mar. 1980 and 1981(1)

(In Units)

							Windrowers Self-Propelled							
	Combines Self-Propelled		Corn Heads		Hay Balers (2)		Power Units		Total Heads		Grinder-Mixers		Shear-Bar Forage Harvesters (3)	
	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981
Alabama	32	23	6	4	15	30	1	.....	.....	.....	58	25	1	3
Alaska	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	9	28	.....	1	5	13	13	19	19	20	3	1	1	3
Arkansas	62	174	.....	1	28	29	.....	.....	.....	.....	33	23	2	2
California	50	68	4	9	26	47	63	84	68	96	.....	2	10	12
Colorado	31	56	14	17	23	26	17	23	19	21	35	19	9	5
Connecticut	.....	.....	.....	.....	8	2	.....	.....	.....	.....	.....	.....	4	3
Delaware	5	6	3	3	1	2	.....	.....	.....	.....	5	2	1	.....
Florida	9	9	4	5	14	15	.....	.....	.....	.....	19	7	7	2
Georgia	47	44	40	14	9	28	1	.....	1	.....	126	19	7	9
Hawaii	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Idaho	22	68	3	.....	33	42	37	42	35	43	18	8	6	3
Illinois	381	390	385	316	34	31	2	3	2	2	197	135	36	36
Indiana	266	215	265	197	27	35	4	1	4	.....	148	86	30	13
Iowa	499	373	453	342	42	46	12	18	12	17	566	357	82	47
Kansas	256	338	35	25	32	39	46	57	44	57	101	60	29	12
Kentucky	42	52	26	23	27	42	1	6	1	1	157	73	15	27
Louisiana	36	47	.....	.....	1	4	.....	.....	.....	.....	4	4	2	2
Maine	.....	.....	.....	.....	2	2	.....	.....	.....	.....	.....	1	3	2
Maryland	22	14	16	21	10	14	1	1	1	1	12	9	9	7
Massachusetts	.....	.....	.....	.....	3	4	.....	.....	.....	.....	.....	.....	1	2
Michigan	86	70	70	55	24	19	3	4	3	4	82	63	50	39
Minnesota	234	221	187	148	80	92	41	54	41	57	250	176	74	66
Mississippi	59	67	.....	2	7	20	.....	.....	.....	.....	13	14	4	4
Missouri	173	140	94	44	48	38	8	2	8	2	232	124	14	17
Montana	37	81	1	.....	31	25	43	37	43	41	25	14	7	2
Nebraska	297	200	214	141	22	19	45	37	42	40	244	129	36	25
Nevada	.....	1	.....	.....	8	3	6	6	7	5	2	.....	1	.....
New Hampshire	.....	.....	.....	.....	5	7	.....	.....	.....	.....	.....	1	4	.....
New Jersey	3	3	5	4	.....	2	.....	.....	.....	.....	3	3	3	2
New Mexico	4	9	2	.....	9	16	8	9	8	9	3	3	.....	.....
New York	23	12	34	16	62	45	8	5	9	6	47	32	74	38
North Carolina	40	41	35	37	24	31	.....	.....	.....	.....	71	45	9	5
North Dakota	139	210	6	6	8	7	33	49	31	51	53	45	7	4
Ohio	215	148	146	122	45	62	2	1	2	1	166	93	34	31
Oklahoma	109	146	2	1	58	54	12	18	13	18	53	33	5	2
Oregon	18	38	3	2	40	33	14	22	16	26	12	7	3	8
Pennsylvania	35	23	44	16	90	71	5	8	7	7	106	83	82	40
Rhode Island	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Carolina	35	26	11	3	6	6	.....	.....	.....	.....	26	15	3	7
South Dakota	77	80	43	25	8	6	41	52	42	55	149	77	28	23
Tennessee	52	41	24	7	44	70	1	.....	1	.....	91	46	10	13
Texas	110	218	19	21	48	104	9	15	8	16	85	56	6	12
Utah	4	2	1	.....	19	18	15	14	15	14	16	3	7	3
Vermont	.....	.....	.....	.....	7	6	.....	.....	.....	.....	1	1	14	6
Virginia	21	10	14	8	45	42	3	.....	3	.....	38	18	17	13
Washington	41	61	2	4	26	20	22	19	19	21	10	2	9	12
West Virginia	.....	.....	.....	.....	14	19	.....	.....	.....	.....	11	4	.....	.....
Wisconsin	69	55	100	62	202	168	46	38	46	39	189	147	240	158
Wyoming	7	11	1	1	12	12	12	14	13	14	4	6	2	2
U.S. Government	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous (4)	.....	.....	.....	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL	**3,657**	**3,819**	**2,312**	**1,715**	**1,332**	**1,468**	**575**	**658**	**583**	**684**	**3,464**	**2,071**	**1,000**	**722**

Data released May 21, 1981, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.

(2) For making bales of under 200 lbs.

(3) Pull-type, mounted, self-propelled.

(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

Mower Conditioners All Types		Manure Spreaders Conveyor-Type		
1980	1981	1980	1981	
9	11	8	4	.........Alabama
.....	1	.....	.....	...........Alaska
2	1	3	1	..........Arizona
45	42	35	30	........Arkansas
3	10	12	20	........California
5	15	22	19	.........Colorado
4	7	24	20	......Connecticut
2	1	34	24	........Delaware
8	12	8	4	..........Florida
30	32	17	10	..........Georgia
.....	.....	.....	.....	..........Hawaii
15	17	31	35	............Idaho
62	92	220	200	...........Illinois
53	63	159	185	..........Indiana
112	148	543	519	............Iowa
75	82	73	58	..........Kansas
127	115	92	89	........Kentucky
10	7	5	6	........Louisiana
4	7	23	10	...........Maine
14	9	85	56	........Maryland
7	4	19	22	...Massachusetts
47	59	270	243	........Michigan
117	117	431	387	.......Minnesota
8	11	5	8	.......Mississippi
208	140	108	82	.........Missouri
16	22	7	6	.........Montana
83	77	151	61	........Nebraska
2	1	5	1	..........Nevada
4	5	18	7	...New Hampshire
9	1	21	12	.......New Jersey
.....	1	2	4	......New Mexico
100	79	478	475	........New York
36	37	60	35	....North Carolina
7	11	20	17	.....North Dakota
101	91	324	288	............Ohio
68	59	20	8	........Oklahoma
29	30	29	18	..........Oregon
122	67	484	392	.....Pennsylvania
1	.....	.....	.....	.....Rhode Island
11	21	14	4	....South Carolina
13	16	65	59	.....South Dakota
80	80	60	39	.......Tennessee
124	103	50	45	...........Texas
11	15	36	34	............Utah
17	8	66	49	.........Vermont
95	61	88	49	..........Virginia
13	26	42	30	......Washington
14	15	16	20	.....West Virginia
252	248	710	637	.......Wisconsin
3	5	8	9	........Wyoming
.....	.....	.....	.....	..U.S. Government
.....	.....	.....	.....	....Miscellaneous
78	2,082	5,001	4,331	.........TOTAL

Take care of your customers: recommend a specialist.

As a Side-Winder dealer, you can provide the answer to any customer need. Because each piece of equipment in our full line is designed and built to do the job better. It's like having a team of specialists on call.

Yet our specialists are versatile. For example, the GB series of rotary cutters was engineered for farmers who wanted a removable hayside to windrow hay. But these models also cut stalks and brush and mow pastures.

Do you hear complaints about wire, twine or vines wrapping around blade spindles? Show your customers how Side-Winder solved that problem with an anti-wrap shield on the blade carrier. And point out that our cutters are reinforced on top, instead of underneath—for smoother material flow and better cleaning.

Help your customer diagnose his problem and decide which specialist he needs. A tire drive, multiple spindle or flail mower? A rotary ditcher or a hitch mounted blade?

Each is backed by FMC's longstanding reputation for innovation, durability, dependability, and quality. When you recommend Side-Winder, you know you're recommending the best!

For information on dealerships, write to FMC Agricultural Machinery, Box 818, Minden, LA 71055. FMC

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AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

YODER & FREY, INC.
Archbold, Ohio
(May 11 & 12, 1981)

ALLIS-CHALMERS TRACTORS

7030 diesel, 1973 (Good)	8250*
7030 diesel, 1973 (Good)	7900*
7000 diesel, 1976 (Good)	8200*
210 diesel,	8000
210 diesel, 1968 (Fair)	6400*
200 diesel, 1972 (Good)	5950*
XT190, 1967 (Good)	5100
XT190, 1965 (Fair)	5100*
XT190, 1965 (Rough)	3800*
XT190, 1965 (Rough)	2450
170, ldr., 1972 (Good)	4500*
D17, 1968 (Fair)	1275*
D17, ldr., 1964 (Fair)	1500
D17, 1961 (Good)	1350*
D14, (Rough)	750
WD45, 1950 (Fair)	1000*
CA, mo., 1954 (Good)	1075
C, plow, cult., mo. (Fair)	450

DAVID BROWN TRACTORS

990 diesel,	1850
885 diesel, ldr., 1975 (Rough)	3750
885 diesel, 1977 (Good)	3525
880 diesel, (New)	5500*

CASE TRACTORS

1070 diesel, 1973 (Fair)	7000
1030 diesel, 1966 (Fair)	4250
970 diesel, 1973 (Fair)	5400*
930 diesel	4100
930,	3100
930 diesel, 1962 (Fair)	2400
830,	1500
730,	2350
730, 1964 (Fair)	2200
730 diesel, 1963 (Fair)	2100
430 diesel, 1963 (Rough)	1400*
310 diesel,	2500

JOHN DEERE TRACTORS

4430 diesel, (Good)	15,800
4430 diesel, 1973 (Good)	15,700
4430 diesel, (Good)	15,500*
4430 diesel, 1974 (Good)	15,400*
4430 diesel, (Fair)	14,900*
4430 diesel, 1973 (Good)	12,000
4430 diesel, (Fair)	10,800
5020 diesel, 1970 (Fair)	6900*
5020 diesel,	6400
4620 diesel, 1971 (Good)	8750*
4030 diesel, 1974 (Good)	13,100*
4020 diesel, 1970 (Good)	8500*
4020 diesel, 1970 (Fair)	7500*
4020 diesel, (Fair)	6500
4020, (Good)	4600
4010 diesel, 1963 (Fair)	4000*
4010 diesel, 1962 (Fair)	4350
4010 diesel, 1962 (Rough)	4200*
4010, 1961 (Fair)	3100*
3020, 1971 (Good)	5000
2010, 1964 (Good)	3150
2010, 1961 (Rough)	1200*
830 diesel, 1961 (Fair)	1900*
820 diesel, 1957 (Rough)	1700*
720, 1957 (Fair)	1425
530, 1957 (Rough)	1425
310, backhoe, ldr., (Good)	9900*
300, backhoe, ldr., (Fair)	5100*
70, 1954 (Fair)	1100*
60, 1954 (Fair)	885
50, 1953 (Fair)	900
MT, (Fair)	1085
M, cult., 1950 (Fair)	1210

FORD TRACTORS

9600 diesel, (Rough)	6000*
8000 diesel, 1970 (Rough)	4400
8000 diesel, 1969 (Fair)	5000*
6000 diesel, 1967 (Good)	1125
5500, backhoe, ldr., (Good)	6150
4600, 1980 (Excellent)	7000*
4500, (Good)	6100
4000, ldr., 1973 (Good)	4500*
4000, ldr., 1973 (Good)	4400*
4000, ldr., 1971 (Fair)	2850
4000, 1957 (Fair)	1450
3600, (New)	7600*
3600 diesel, (New)	7400*
3400, ldr., 1970 (Rough)	3100
3400, 1970 (Fair)	2800*
3000, 1970 (Fair)	4400*
3000, 1969 (Rough)	1900
2000 diesel, 1971 (Fair)	2750
900, 1956 (Rough)	1050*
641, 1954 (Good)	2750
641, ldr., 1954 (Fair)	2275
640, ldr., 1956 (Fair)	2000*
601, 1955 (Fair)	1700
600, 1966 (Fair)	1425*
541, cult., 1954 (Rough)	1400*
Jub., 1953 (Fair)	1675
8N, 1952 (Good)	1800
8N, 1951 (Fair)	1125
8N, 1950 (Good)	1650
8N, 1949 (Fair)	1050*
8N, 1949 (Fair)	975
8N, 1947 (Rough)	950
9N, 1945 (Fair)	1120
9N, 1945 (Good)	1050
9N, 1945 (Fair)	800

INTERNATIONAL HARVESTER TRACTORS

3588 diesel, (Good)	38,000*
1566 diesel, 1973 (Good)	12,500*
1566 diesel, 1976 (Good)	11,500*
1206 diesel, 1966 (Good)	5200*
1086 diesel, (Good)	16,750*
1066 diesel, 1973 (Good)	9260
1066 diesel, hydro., 1973 Rough	5750*
986 diesel, (Good)	10,000
966 diesel, 1973 (Fair)	9000
966 deisel, 1972 (Good)	8000*
986 diesel, duals, 1977 (Excellent)	17,500
856 diesel, 1970 (Fair)	7350
856 diesel, 1970 (Fair)	7350*
856 diesel, 1970 (Rough)	5000*
856 diesel, 1968 (Good)	6000*
806, 1965 (Fair)	4825
806 diesel, 1965 (Fair)	4550*
806, 1965 (Fair)	4150*
806 diesel, 1963 (Fair)	4850*
766 diesel, 1973 (Good)	7700*
766 diesel, 1972 (Fair)	7400*
706, 1966 (Fair)	1650*
656, 1968 (Fair)	3400*
656, ldr., 1966 (Fair)	2800*
606, ldr., 1962 (Fair)	3250
560 diesel, 1959 (Fair)	2000*
560, 1960 (Rough)	1375
560, 1961 (Fair)	1300*
504, 1962 (Good)	2300*
460, 1961 (Rough)	850*
400, (Good)	2000
400, 1956 (Rough)	1050
400, ldr.,	1000
200, plow, cult.,	1850
200, 1956 (Rough)	975
Sup. MTA, 1954 (Good)	1425
Sup. M, (Good)	1250
Sup. MTA, 1952 (Fair)	1050*
M, 1951 (Fair)	825
M, 1950 (Fair)	800
M, 1950 (Fair)	685
H,	785
H, 1950 (Fair)	585
A, 1952 (Rough)	1000
Sup. A, mo., 1947 (Fair)	1050
Cub 185, mo., 1976 (Good)	2400*
Cub 154, (Fair)	1550
Cub 154, (Good)	2375
Cub 154, mo.,	2300
Cub Loboy, mo.,	1800

MASSEY-FERGUSON TRACTORS

2135 diesel, 1972 (Rough)	2100*
1805 diesel, (Good)	11,500*
1085, 1972 (Fair)	7200*
1080 diesel, 1970 (Fair)	4100
230, (New)	7000*
180 diesel, 1968 (Rough)	2450
165, 1970 (Fair)	3300*
165, 1970 (Rough)	2700*
150, 1967 (Good)	3000
135, ldr., 1970 (Good)	3500
135 diesel, 1970 (Rough)	2300*
135,	2075
85, (Rough)	1000
65, 1960 (Fair)	2500
65 diesel, 1960 (Fair)	2350*
65,	1800
50, ldr., 1960 (Good)	2725
50,	2150
35, 1956 (Fair)	2150*

OLIVER TRACTORS

1950 turbo,	5800
1800, 1962 (Fair)	3000*
1850, 1966 (Fair)	2550
1800, 1962 (Fair)	2500*
1650, 1963 (Fair)	2500*
1600, 1962 (Fair)	1925
1550, 1964 (Fair)	2200*
880 diesel, 1957 (Fair)	750
770,	1025
77 diesel, 1956 (Rough)	500

MINNEAPOLIS-MOLINE TRACTORS

G1350, 1968 (Fair)	3500*

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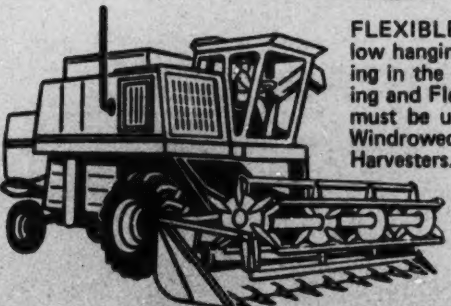

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VERSATILE TRACTOR

750, 1979 (Good)	29,000*

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ALLIS-CHALMERS TRACTORS

7040 diesel, cab, 1976 (Good)	9000*
190 diesel, 1967 (Fair)	3000*
D17 diesel, 1959 (Fair)	775

CASE TRACTORS

930 diesel, 1961 (Fair)	1900
600 diesel, 1958 (Fair)	1400

DEUTZ TRACTOR

13006 diesel, cab, 1974 (Good)	6950

MASSEY-FERGUSON TRACTORS

1100 diesel, 1966 (Rough)	2700*
1080 diesel, 1972 (Good)	3800*
285 diesel, 1979 (Excellent)	8500*
245 diesel, 1976 (Good)	5700*
230 diesel, 1979 (Excellent)	6800*
180 diesel, 1966 (Excellent)	3500*
165 diesel, 1967 (Good)	3250*
165 diesel, 1967 (Good)	3300
135 diesel, 1971 (Good)	2900
135 diesel, 1968 (Good)	2900*
65 diesel, 1963 (Good)	2150
65 diesel, 1960 (Good)	2000
65 diesel, 1960 (Good)	1800*
65 diesel, 1959 (Good)	2350*
50A- diesel, ldr., backhoe, 1975 (Good)	4750
50 diesel, 1964 (Good)	1950*
50, 1958 (Good)	1900
35, 1960 (Good)	1900*
35, 1959 (Fair)	1200*
35, 1959 (Good)	1650*
35, 1956 (Fair)	1225*
35, 1956 (Good)	1900
T030, 1954 (Good)	1100*
T020, 1949 (Good)	850
T020, 1949 (Excellent)	1500

FORD-FERGUSON TRACTORS

9N, 1946 (Good)	825*
9N, 1944 (Rough)	525*

FORD TRACTORS

8600 diesel, 1975 (Good)	6200*
8000 diesel, 1971 (Fair)	3700*
7600 diesel, 1977 (Good)	7800
7000 diesel, 1974 (Good)	6300*
5000 diesel, 1969 (Fair)	3500*
4500 diesel, ldr., backhoe, 1969 (Fair)	4000
4000 diesel, 1970 (Good)	4500
3600 diesel, 1978 (Good)	6000
3400 diesel, 1970 (Fair)	1950*
3000 diesel, 1968 (Good)	3700
3000 diesel, 1968 (Fair)	2400
2000, 1968 (Good)	3000
850, 1955 (Good)	1950*
841, 1958 (Good)	2200
841 diesel, 1958 (Good)	1700*
641, 1959 (Good)	1800*
641, 1958 (Good)	1875
641, 1958 (Good)	1950
640, 1956 (Good)	1700*
640, 1956 (Fair)	1250
640, 1955 (Good)	1900*
640, 1955 (Fair)	1200*
420 diesel, ldr., 1978 (Excellent)	10,500
Sup. Dex., 1962 (Excellent)	1600
Dexta, 1959 (Good)	1200
Jub., 1953 (Good)	1550*
8N, 1952 (Good)	900
8N, 1950 (Excellent)	1300
8N, 1948 (Good)	900
8N, 1948 (Excellent)	1400
8N, 1948 (Rough)	675
8N, 1948 (Rough)	775
8N, 1948 (Fair)	800

INTERNATIONAL HARVESTER TRACTORS

806 diesel, 1969 (Excellent)	5500
806 diesel, duals, sprayer, 1964 (Good)	4600*
574 diesel, 1972 (Good)	3300*
574 diesel, 1972 (Good)	3200*
504 diesel, 1966 (Rough)	1250
504 diesel, 1964 (Fair)	2300*
504 diesel, 1963 (Rough)	1000
460 diesel, 1960 (Rough)	800
2444, 1968 (Fair)	1500
444 diesel, 1966 (Fair)	2000
Sup. A, cult., 1953 (Excellent)	2150*
Sup. A, d[illegible]plow, 1952 (Good)	1100
Cub, mo., 1951 (Excellent)	1775

JOHN DEERE TRACTORS

4020 diesel, 1970 (Good)	6550
4020 diesel, 1968 (Fair)	5000
4020 diesel, 1966 (Fair)	5100*
3020 diesel, 1969 (Excellent)	5700*
2520 diesel, 1970 (Excellent)	6450
2030 diesel, 1974 (Good)	4200
2020 deisel, 1966 (Good)	3850*
2020 diesel, 1966 (Fair)	3250
2010 diesel, ldr., backhoe, 1962 (Fair)	2100*
1010, 1962 (Fair)	1600*
1010, 1962 (Fair)	1650
430, 1960 (Good)	1250
40, 1954 (Fair)	700
40, 1954 (Fair)	725*

LONG TRACTOR

364 diesel, 1972 (Fair)	1750

OLIVER TRACTORS

1855 diesel, 1973 (Good)	5250
1755 diesel, 1972 (Good)	4500
1755 diesel, 1972 (Good)	5100*
1650 diesel, 1967 (Fair)	2000

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.
Prices reported are NOT averages.

Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

DEMONSTRATOR means—used for demonstrating only and in practically new condition.

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INTERTEC PUBLISHING CORP.

July 15, 1981 • Vol. 96 • No. 15

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

10: **More Dealers Bidding for Short Supply of Available People.** Some dealers are turning to employment firms that specialize in farm equipment dealership employees to locate qualified, experienced personnel.

16: **Looking Into New Technologies.** Farm & Industrial Equipment Institute marketing executives took a look at hydroponics, alternate fuels, the application of agricultural technology to world needs and electronic instrumentation in today's farm equipment at the recent Marketing & Management conference held in Springfield, Ill.

22: **Diagnosing Service Problems With Ultrasonics?** Use of ultrasonic detectors is said to be widespread in the trucking and automotive maintenance industry, but few people in the farm equipment industry seem to be familiar with them.

28: **More Ideas From Other Dealers.** McPherson, Kan., dealer Aubrey McNally solicited ideas from other dealers on features for his new facility (I&T June 7). Part 2 is a pictorial presentation of some of those features.

34: **Conventions, Meetings, Shows, 1981-82.** I&T presents its annual listings of dealer association conventions, farm machinery shows in North America and overseas, professional association gatherings and state and regional fairs.

On the cover... Dealers and farmers view the newest farm machinery at the Iowa Power Farming Show held last February in Des Moines' Veterans Memorial Auditorium.

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what's ahead...

I&T
SINCE 1886

July 15, 1981

YOU ONLY NEED ONE HAND TO COUNT THE PLUSES in the May flash report from the Farm & Industrial Equipment Institute. Combine sales were nearly 26 per cent above the May 1980 mark; baler sales were 18.5 per cent ahead, and mower-conditioners had nearly a 14 per cent jump. Combine and baler sales for the first five months were 5.8 and 5.6 per cent ahead of 1980 figures. The flash report:

	Unit Retail Sales					
	May			January-May		
	1981	1980	Pct. Change	1981	1980	Pct. Change
Farm Wheel Tractors:						
2-wheel drive						
40-100 HP	4,890	5,535	-11.7	22,124	23,936	- 7.6
Over 100 HP	3,155	3,348	- 5.8	17,134	20,037	-14.5
Total 2-wheel dr.	8,045	8,883	- 9.4	39,258	43,973	-10.7
4-wheel drive	679	734	- 7.5	4,089	4,241	- 3.6
Total Tractors	8,724	9,617	- 9.3	43,347	48,214	-10.1
Combines (S-P)	1,175	933	+25.9	5,914	5,589	+ 5.8
Balers*	1,236	1,043	+18.5	3,374	3,195	+ 5.6
Forage Harvesters**	399	486	-17.9	1,390	2,006	-30.7
Mower-Conditioners	1,967	1,728	+13.8	4,911	4,966	- 1.1

*Bales under 200 lbs. **Shear-bar type.

IF THE DOLLAR IS GAINING STRENGTH AGAINST OTHER CURRENCIES, then farm equipment exports should be hurt and imports should be helped, right? Wrong, at least according to U.S. Commerce Dept. data for the first quarter of 1981. First quarter exports were $726.3 million, an increase of almost 19 per cent. First quarter imports were $396 million, a decline of one-third.

Sales to Canada were up 26 per cent for the quarter to $348 million; they were also up 26 per cent to Mexico--$56 million. (And sales to Nicaragua--believed to be a conduit for farm equipment going to Cuba--was up substantially, too!) Sales to Australia, another big customer, were up 5 per cent at $40 million.

Imports dropped sharply from Canada (off 40 per cent to $167 million), from Japan (down 25 per cent to $52 million), the United Kingdom (down 37 per cent to $45 million) and West Germany (down 38 per cent to $42 million).

Farm tractor parts are a major commodity in both export and import areas. Exports for the first 1981 quarter went up 6 per cent to $179 million; imports declined 38 per cent to $81 million.

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Changes in IH's Marketing, Distribution Structure

page 10

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Creative Coping at Buck & Sons

page 18

August 7, 1981 • Vol. 96 • No. 16

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

10: IH Reorganizes Its Marketing, Distribution Structure. Better and faster responsiveness is the objective of the company that once had the most warehousing branches in the business, but now has none. Instead, they've gone to 48 district offices, a separate general sales office and a single distribution center.

18: Coping Creatively With An Economic Slowdown. Tacoma, Wash., Ford dealer Wayne Buck took some drastic steps during the past year to cut operating costs, but increased his gross margin. First of a two-part feature on adjusting to recession.

38: Four New Products From Owatonna. Rather than vastly expanding its North American dealer network, this supplier aims at enriching its appeal to its present dealers with a new windrower, smaller round baler, grinder-mixer and mower-conditioner.

46: Meet Bob Tweedy. The new president of the American Society of Agricultural Engineers (ASAE) comments on a wide range of issues including farm equipment suppliers' and dealers' relations with the organization.

On the cover... An Axial Flow Combine and a 2+2 tractor are loaded onto a standard trailer at International Harvester's Quad Cities' releasing yard for delivery to a dealer.

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what's ahead...

I&T
SINCE 1886

August 7, 1981

JUST IN: U.S. RETAIL FARM EQUIPMENT SALES FOR JUNE. According to the flash report of the Farm & Industrial Equipment Institute, tractors were off 28 per cent and combines up 19 per cent, with similar contrasts showing for the six months. June, 1981, compares with a month, June, 1980, which experienced an 8 per cent tractor sales decline and a 31 per cent combine decline from June, 1979.

	Unit Retail Sales					
	June			January-June		
	1981	1980	Pct. Change	1981	1980	Pct. Change
Farm Wheel Tractors:						
2-wheel drive						
40-100 hp	4,614	6,806	-32.2	26,765	30,742	-12.9
Over 100 hp	2,942	3,869	-24.0	20,074	23,906	-16.0
Total 2-wheel drive	7,556	10,675	-29.2	46,839	54,648	-14.3
4-wheel drive	660	785	-15.9	4,748	5,026	- 5.5
Total Tractors	8,216	11,460	-28.3	51,587	59,674	-13.6
Combines (S-P)	1,799	1,512	+19.0	7,713	7,101	+ 8.6
Balers*	2,607	2,720	- 4.2	5,979	5,915	+ 1.1
Forage Harvesters**	808	787	+ 2.7	2,252	2,793	-19.4
Mower Conditioners	4,555	4,491	+ 1.4	9,490	9,457	+ 0.3

*Bales under 200 lbs. **Shear-bar type.

IN WHAT FAR-AWAY LAND ARE EQUIPMENT SALES UP? In Canada. According to the Canadian Farm & Industrial Equipment Institute, tractor retail sales in the first five months are up 9.1 per cent (up 10.3 per cent for May) with 11,524 units sold. Combine sales are up 21 per cent through the first five months, with 881 units retailed. Sales of conventional-size balers, however, are off 10.9 per cent at 523. Mower-conditioners--666 units sold--are even with last year.

PRICES OF TRACTORS AND SELF-PROPELLED MACHINERY TO FARMERS, says the USDA's Agricultural Outlook, will be up 10 to 12 per cent this year, compared with 12 per cent last year. This estimate, however, apparently fails to take in the substantial rebating being conducted by major companies, as well as major efforts by dealers to cut inventories through intense discounting. For example, a recent study by Bernstein & Co. of the farm equipment industry noted that International was offering discounts from suggested list price of 9.1 per cent on the 986, 7.9 per cent on the 1086, 9.3 per cent on the 3588 and 9.7 per cent on the 4586.

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RETAIL SALES OF WHEEL TRACTORS
(In Units)

	Total Wheel Tractors†				Cumulative for Jan.-April, 1980				Cumulative for Jan.-April, 1981			
	April, 1980		April, 1981		Farm Type				Farm Type			
	Farm	Non-Farm	Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm
Alabama	213	26	286	44	874	33	907	134	657	16	673	110
Alaska	1	1	3	2	4	.....	4	3	9	.....	9	15
Arizona	71	33	79	42	279	31	310	165	257	24	281	129
Arkansas	428	56	275	36	1,225	158	1,383	188	965	142	1,107	118
California	447	186	518	213	1,457	101	1,558	896	1,433	146	1,579	780
Colorado	136	36	119	45	322	77	399	202	350	77	427	166
Connecticut	46	23	22	16	86	.....	86	74	56	1	57	49
Delaware	25	3	10	.....	64	4	68	10	40	1	41	9
Florida	170	102	245	100	734	19	753	427	789	19	808	375
Georgia	231	39	229	68	1,128	22	1,150	151	882	12	894	192
Hawaii	5	9	7	4	17	.....	17	43	24	3	27	22
Idaho	112	15	183	6	334	35	369	54	509	73	582	57
Illinois	467	56	632	73	1,702	274	1,976	252	1,540	293	1,833	239
Indiana	327	50	325	36	974	168	1,142	177	799	131	930	120
Iowa	564	21	809	19	2,175	226	2,401	91	2,065	234	2,299	62
Kansas	377	34	249	43	998	229	1,227	132	691	167	858	115
Kentucky	360	23	412	28	1,289	29	1,318	102	1,245	19	1,264	173
Louisiana	245	62	374	74	892	108	1,000	213	958	99	1,057	244
Maine	16	14	28	6	51	2	53	45	72	3	75	24
Maryland	86	30	75	23	244	20	264	96	166	11	177	121
Massachusetts	9	15	19	23	34	.....	34	79	42	.....	42	85
Michigan	225	62	390	62	706	73	779	275	759	125	884	227
Minnesota	489	42	695	26	1,223	253	1,476	146	1,456	251	1,707	100
Mississippi	311	29	307	36	1,203	109	1,312	106	880	80	960	113
Missouri	345	66	346	50	1,286	105	1,391	220	940	99	1,039	155
Montana	181	28	143	16	365	101	466	74	270	87	357	52
Nebraska	295	9	329	5	1,292	159	1,451	61	971	103	1,074	42
Nevada	15	10	18	17	37	5	42	43	40	6	46	41
New Hampshire	14	10	10	10	38	.....	38	28	20	.....	20	28
New Jersey	37	39	19	49	105	.....	105	155	75	.....	75	127
New Mexico	73	16	43	24	157	9	166	69	124	14	138	94
New York	249	84	258	69	684	26	710	276	630	56	686	236
North Carolina	377	52	292	60	1,174	18	1,192	215	1,003	13	1,016	186
North Dakota	311	21	403	8	517	294	811	38	597	321	918	21
Ohio	417	70	417	56	1,266	137	1,403	274	1,010	129	1,139	226
Oklahoma	228	43	226	71	734	106	840	182	567	78	645	248
Oregon	133	23	143	32	380	24	404	150	325	41	366	111
Pennsylvania	168	79	231	98	656	19	675	350	620	32	652	283
Rhode Island	1	3	3	3	5	.....	5	18	5	.....	5	16
South Carolina	165	20	113	37	558	22	580	99	381	9	390	113
South Dakota	183	6	179	7	543	103	646	33	456	100	556	23
Tennessee	272	38	301	27	1,016	35	1,051	138	860	27	887	113
Texas	684	334	941	329	2,950	202	3,152	1,241	2,790	164	2,954	1,182
Utah	81	17	59	31	175	11	186	111	214	11	225	105
Vermont	18	3	25	7	64	.....	64	6	83	1	84	18
Virginia	198	39	196	41	696	12	708	220	517	7	524	153
Washington	237	64	182	45	584	52	636	160	451	70	521	108
West Virginia	44	6	33	10	121	.....	121	37	98	.....	98	47
Wisconsin	500	40	585	37	1,394	83	1,477	169	1,283	101	1,384	133
Wyoming	54	11	62	18	104	12	116	59	140	14	154	70
U.S. Government	17	45	.....	1	43	.....	43	296	4	.....	4	33
Miscellaneous‡	13	69	49	109	130	.....	130	235	95	.....	95	225
TOTAL	**10,671**	**2,212**	**11,897**	**2,292**	**35,089**	**3,506**	**38,595**	**9,018**	**31,213**	**3,410**	**34,623**	**7,836**

Data released June 18, 1981, Farm & Industrial Equipment Institute.

*Figures do not include garden tractors, motor tillers or contractors off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland Satoh); Allis-Chalmers; Belarus; J I Case; Deere; Deutz; Ford; International Harvester; Long; Massey-Ferguson; R. M. Wade (Satoh); Steiger; Versatile; and White.

†The monthly sales are those reported for that month only. The cumulative totals are subject to revision reflecting updating in the basic sales data.

‡Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

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RETAIL SALES OF SELECTED FARM EQUIPMENT – Jan.-Apr., 1980 and 1981(1)
(In units)

	Combines Self-Propelled		Corn Heads		Hay Balers(2)		Windrowers Self-Propelled Power Units		Windrowers Self-Propelled Total Heads		Grinder-Mixers		Shear-Bar Forage Harvesters(3)	
	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981
Alabama	42	33	7	5	20	47	2	.....	1	.....	68	29	3	8
Alaska	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	15	37	.....	1	6	23	22	26	30	29	4	1	2	6
Arkansas	95	199	.....	1	45	53	.....	.....	.....	.....	38	28	2	2
California	70	90	6	13	32	57	88	118	103	131	.....	2	19	19
Colorado	45	75	19	19	30	33	27	30	29	34	36	21	17	6
Connecticut	.....	.....	.....	.....	12	3	.....	.....	.....	.....	.....	.....	6	3
Delaware	6	6	3	3	1	2	1	1	1	1	6	2	1	1
Florida	13	10	5	7	18	18	.....	.....	.....	.....	23	8	9	2
Georgia	60	60	50	19	16	43	1	.....	1	.....	143	34	12	16
Hawaii	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Idaho	32	83	3	1	69	64	44	54	42	54	24	12	10	4
Illinois	473	458	480	394	51	48	4	4	4	4	253	176	50	51
Indiana	322	255	312	239	37	50	4	1	4	1	189	105	39	18
Iowa	600	455	555	444	57	58	17	25	17	24	657	427	121	64
Kansas	439	442	58	25	73	57	60	70	58	71	124	79	49	14
Kentucky	56	57	31	28	41	59	1	6	1	3	184	88	29	34
Louisiana	45	58	.....	1	8	17	.....	.....	.....	.....	7	4	5	2
Maine	.....	.....	.....	.....	4	6	.....	.....	.....	.....	.....	1	8	3
Maryland	27	15	20	25	19	16	4	1	4	1	15	13	17	10
Massachusetts	.....	.....	.....	.....	6	4	.....	.....	.....	.....	.....	.....	1	4
Michigan	94	87	82	67	38	32	6	10	6	9	104	89	67	51
Minnesota	265	274	216	182	144	119	63	72	62	77	297	240	110	92
Mississippi	73	80	.....	2	13	31	.....	.....	.....	.....	16	15	11	8
Missouri	202	173	111	55	78	69	11	7	11	9	273	155	21	24
Montana	65	111	2	2	42	33	57	51	58	57	31	18	8	2
Nebraska	337	233	257	155	31	27	56	50	52	54	293	161	52	30
Nevada	1	1	.....	.....	10	5	8	11	9	11	2	2	1	1
New Hampshire	.....	.....	.....	.....	9	12	.....	.....	.....	.....	.....	1	5	.....
New Jersey	6	4	7	5	3	5	.....	.....	.....	.....	4	3	4	3
New Mexico	4	13	2	.....	14	23	9	15	9	15	4	4	.....	.....
New York	25	15	35	19	101	57	9	7	10	8	59	46	107	45
North Carolina	50	46	44	36	40	52	.....	.....	.....	.....	81	49	11	7
North Dakota	165	256	7	10	11	7	43	63	45	66	64	51	15	5
Ohio	293	184	197	150	76	79	3	1	3	1	202	113	48	42
Oklahoma	145	201	2	1	91	83	18	29	18	30	59	37	5	4
Oregon	24	48	3	2	54	50	30	32	31	50	16	8	6	9
Pennsylvania	37	29	46	21	135	92	5	10	7	9	138	99	100	60
Rhode Island	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Carolina	41	28	16	6	14	16	.....	.....	.....	.....	30	15	7	9
South Dakota	92	95	52	36	19	7	60	58	64	62	182	92	39	28
Tennessee	65	52	33	11	65	99	1	.....	1	.....	94	56	21	22
Texas	164	287	22	30	104	176	10	24	9	31	105	66	23	17
Utah	4	7	1	.....	35	25	19	16	19	15	18	6	9	4
Vermont	.....	.....	.....	.....	16	11	.....	.....	.....	.....	1	1	25	7
Virginia	26	19	18	13	67	62	3	.....	3	.....	48	23	38	18
Washington	51	81	6	6	48	35	29	24	25	29	11	3	15	18
West Virginia	.....	.....	.....	.....	26	26	.....	.....	.....	.....	14	6	.....	1
Wisconsin	89	67	113	70	305	226	67	49	66	52	255	199	367	215
Wyoming	9	15	1	1	18	14	14	16	15	19	5	9	3	2
U.S. Government	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous (4)	.....	.....	.....	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL	**4,867**	**4,739**	**2,824**	**2,119**	**2,152**	**2,138**	**796**	**883**	**818**	**957**	**4,177**	**2,597**	**1,520**	**991**

Data released June 18, 1981, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled.
(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

Mower Conditioners All Types		Manure Spreaders Conveyor-Type		
1980	1981	1980	1981	
17	24	12	5	..........Alabama
.....	2	.....	1	............Alaska
2	3	4	1	..........Arizona
65	69	50	40	.........Arkansas
10	13	19	23	........California
12	24	31	27	..........Colorado
12	8	31	29	......Connecticut
4	1	41	30	.........Delaware
13	15	10	11	..........Florida
53	55	19	13	..........Georgia
.....	.....	.....	.....	..........Hawaii
19	20	50	49	............Idaho
83	128	296	248	...........Illinois
79	91	216	234	..........Indiana
157	185	691	664	............Iowa
114	110	109	72	..........Kansas
169	161	129	123	........Kentucky
12	13	9	7	........Louisiana
11	11	38	21	...........Maine
16	11	113	73	........Maryland
11	6	30	28	...Massachusetts
74	78	343	313	........Michigan
178	155	589	487	.......Minnesota
12	23	8	11	.......Mississippi
302	191	155	113	..........Missouri
18	27	17	8	..........Montana
112	97	213	86	........Nebraska
2	2	.....	1	..........Nevada
10	10	24	13	...New Hampshire
9	3	23	16	.......New Jersey
2	2	3	4	......New Mexico
149	113	607	590	........New York
54	50	75	47	....North Carolina
12	12	32	26	.....North Dakota
151	123	415	358	............Ohio
121	105	25	13	.........Oklahoma
37	38	40	28	..........Oregon
182	90	632	512	.....Pennsylvania
1	.....	.....	.....	.....Rhode Island
13	27	15	4	....South Carolina
17	19	90	84	.....South Dakota
119	130	85	58	.......Tennessee
178	178	67	61	...........Texas
17	20	55	39	............Utah
24	13	89	71	.........Vermont
153	88	115	69	..........Virginia
26	37	64	41	......Washington
29	22	30	31	.....West Virginia
374	335	947	803	.......Wisconsin
3	6	16	13	........Wyoming
.....	.....	.....	.....	..U.S. Government
.....	.....	.....	.....	....Miscellaneous
3,236	**2,944**	**6,677**	**5,599**	.........**TOTAL**

GRAIN CLEANERS ARE SELLING NOW!

SIOUX
MODEL 42

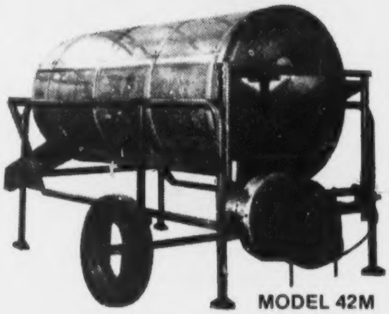
CASH IN NOW!

Your Customers Know Clean Grain Dries at Less Cost . . . Stores Better . . . Sells Higher

SIOUX GRAIN CLEANERS

SIOUX Cleaners are your customers' first choice. Both models have big 42" diameter double-cleaning drums that handle up to 1,900 BPH of 15% corn. Inside drums clean heavy trash . . . outside drums clean weed seeds and fines. That makes faster and more complete cleaning of corn, beans, wheat, sunflowers, barley, etc. Big ground clearance knocks out back-breaking clean-up chores. SIOUX 42M easily moved by hand around bin site.

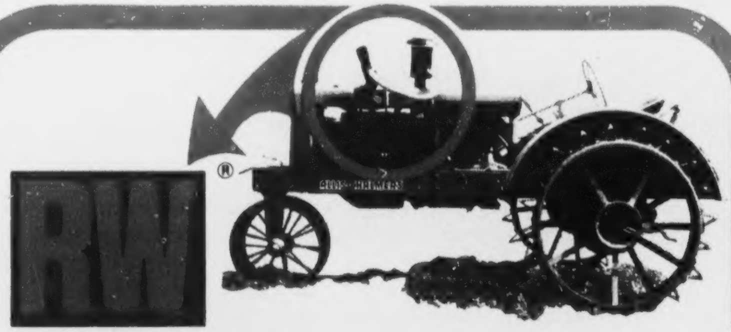
Grain cleaners are selling now! Your customers want a SIOUX Grain Cleaner. Contact us today for full information and discounts.



Write Dep't. K-325-81
SIOUX STEEL CO.
Sioux Falls, So. Dak. 57101

SIOUX STEEL COMPANY

Circle (9) on Reply Card



Precleaners work for years and years and years

The RW Precleaner has superior quality and workmanship, and has absolutely no moving parts. It will perform for the life of the equipment on which it is installed. No dealer maintenance is ever required, which provides more dealer profits and no dealer aggravation. These facts coupled with the best distributor organization and service in the industry, makes becoming a RW dealer a real pleasure.

Write for complete dealer information today.

If you don't, you are missing a sure bet.

asi ACCESSORY SALES, INC.
POST OFFICE BOX 214
KIMBALL, NEBRASKA 69145
PHONE: (308) 235-4685

Name
Company
Address
City State Zip

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AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

JONES FARM EQUIPMENT CO.
Dothan, Alabama
(June 9, 1981)

ALLIS-CHALMERS TRACTOR

7040 diesel, 1976 (Good)	9975*

CASE TRACTORS

5808 diesel, ldr., backhoe, 1972 (Good)	5700
5808 diesel, ldr., backhoe, 1972 (Good)	5700*
5808 diesel, ldr., backhoe, 1971 (Fair)	4250
480C diesel, ldr., (Good)	6500

DAVID BROWN TRACTORS

1212 diesel, 1974 (Fair)	3100*
990 diesel, 1968 (Good)	2150

MASSEY-FERGUSON TRACTORS

1105 diesel, 1976 (Good)	6600*
1105 diesel, 1973 (Good)	6400*
1100 diesel, 1969 (Fair)	3900
1080 diesel, 1972 (Fair)	3600*
1080 diesel, 1970 (Good)	5200
285 diesel, 1977 (Excellent)	8100
285 diesel, 1976 (Good)	6350
285 diesel, 1975 (Good)	6600*
285 diesel, 1975 (Good)	5600
255 diesel, 1977 (Excellent)	6600
245 diesel, 1976 (Good)	4250
245 diesel, 1976 (Excellent)	6100
235 diesel, 1976 (Good)	4000
188 diesel, 1969 (Good)	3800
180 diesel, 1969 (Good)	3300
180 diesel, 1966 (Good)	2950*
180 diesel, 1966 (Good)	3100*
175 diesel, 1975 (Good)	4000
165 diesel, 1967 (Fair)	3050*
165 diesel, 1967 (Good)	3600
165 diesel, 1967 (Good)	3450
165 diesel, 1967 (Fair)	2800
135 diesel, 1973 (Fair)	2400*
135 diesel, 1971 (Good)	2900
135, 1968 (Good)	3300
135 diesel, 1968 (Good)	2900*
135 diesel, 1968 (Good)	3400
135 diesel, 1966 (Good)	2800
130, 1966 (Good)	1550
65 diesel, 1963 (Fair)	1400*
65 diesel, 1963 (Good)	2075
50 diesel, 1963 (Good)	1675
50 diesel, 1963 (Good)	1800*
50 diesel, 1961 (Good)	1750*
35 diesel, 1963 (Good)	2350
35, 1963 (Good)	1875
35, 1959 (Fair)	950
35 diesel, 1959 (Fair)	1325
35, 1957 (Good)	1800
35, 1956 (Fair)	1150
35, 1956 (Fair)	1450
35, 1956 (Rough)	1000
35, 1956 (Fair)	1250
TO 20, 1949 (Good)	800

FORD-FERGUSON TRACTOR

9N, 1946 (Good)	900

FORD TRACTORS

9600 diesel, 1973 (Good)	5875
8600 diesel, 1974 (Good)	6000
8000 diesel, 1969 (Fair)	3600
7600 diesel, 1975 (Good)	6925
5000 diesel, 1976 (Good)	4400*
5000 diesel, 1975 (Excellent)	5300
5000 diesel, 1968 (Good)	4450
5000 diesel, 1968 (Rough)	2900
3400 diesel, ldr., 1968 (Good)	2900
4000 diesel, ldr., 1972 (Excellent)	5700*
4000, 1968 (Fair)	2600*
4000, 1968 (Good)	3400
4000, 1968 (Good)	2950*
4000 diesel, 1968 (Good)	3350
4000, 1963 (Fair)	1450
4000, 1963 (Excellent)	3100*
4000, 1963 (Good)	1925
3600 diesel, 1972 (Good)	5300*
3400 diesel, 1970 (Fair)	1900
3400 diesel, 1968 (Rough)	1050
3000, 1966 (Good)	2900
2000, 1967 (Good)	2400
2000, 1963 (Rough)	975
2000, Select-O-Speed, 1963 (Rough)	800
2000 diesel, 1963 (Fair)	1400
Sup. Maj. diesel, 1962 (Good)	875
850, 1959 (Excellent)	2300
851, 1958 (Good)	1775*
851 diesel, 1958 (Fair)	1500*
850 diesel, 1955 (Good)	1900*
841, cutter, 1961 (Fair)	1550
841, 1958 (Fair)	1500
641, 1960 (Fair)	1600
641, 1959 (Good)	1950*
641, 1958 (Fair)	1675
641, 1958 (Rough)	1025
640, 1956 (Good)	1950*
NAA, 1954 (Fair)	1200*
8N, 1952 (Excellent)	1400*
8N, 1949 (Good)	1050
8N, 1948 (Good)	900*

INTERNATIONAL HARVESTER TRACTORS

1066 diesel, 1973 (Good)	6800*

(More...)

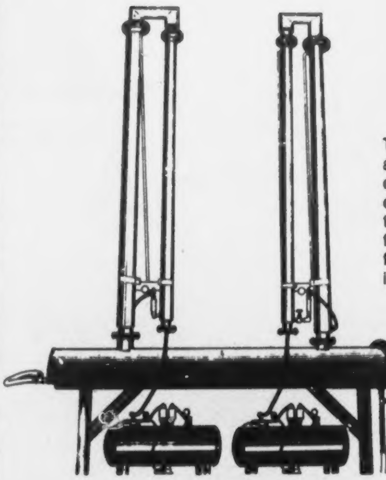
Heart disease and stroke will cause half of all deaths this year.

Put your money where your Heart is.

American Heart Association
WE'RE FIGHTING FOR YOUR LIFE

Farm Size Alcohol Still

the HCFV Alcohol Still (60% More Efficient)



The Horizontal Continuous Feed Vacuum (HCFV) alcohol still is at least 5 years ahead of anything else on the market! This revolutionary still decreases the energy required to convert grain to alcohol by 50% to a mere 20,000 BTU's per gallon, thus reducing the fuel necessary to operate the still. This patent applied for process is only available on the HCFV still and is now offered by Modular Fuel Systems.

- 5-100 Gallons Per Hour 6 Different Sizes
- Continuous Flow Vacuum Process
- Complete Systems
- Installation Available
- Advance Technology

Call or Write for More Information
Dealer Inquiries Invited

MFS
MODULAR FUEL SYSTEMS
2348 FM 1960 West • Houston, Texas 77068
(713) 537-6155

Circle (32) on Reply Card

Auctions *(continued)*

1066 diesel, 1972 (Good)	6400*
656 diesel, 1969 (Rough)	1700
656 diesel, 1966 (Good)	3300*
656 diesel, 1965 (Fair)	2850
574 diesel, 1973 (Good)	2950*
574 diesel, 1973 (Good)	2900*
574 diesel, 1973 (Good)	3175
574 diesel, 1973 (Excellent)	4025
504 diesel, 1967 (Good)	1800
504 diesel, 1967 (Good)	2325
460 diesel, 1963 (Good)	1100
454 diesel, 1971 (Fair)	2250
2444, 1969 (Rough)	1000
424 diesel, 1967 (Good)	1900*
B414, 1960 (Good)	1775
340, 1960 (Fair)	800*
284 diesel, 1977 (Good)	3250
284 diesel, 1976 (Fair)	1900*
275 diesel, 1959 (Good)	725
W 6, 1953 (Rough)	425*
Sup. C, 1953 (Good)	800
Sup. A, 1950 (Good)	1000
Cub, mo., cult., 1952 (Excellent)	2200
Cub, mo., 1949 (Good)	1050*

JOHN DEERE TRACTORS

4630 diesel, cab, duals, 1975 (Good)	11,900*
4020 diesel, 1967 (Fair)	3750*
4020 diesel, 1966 (Good)	5000*
4020, 1964 (Excellent)	5700
4010 diesel, bld., 1963 (Excellent)	5500
3020 diesel, 1965 (Rough)	2500*
3010, 1962 (Rough)	2300*
2020 diesel, 1966 (Fair)	3400*
2010 diesel, 1961 (Fair)	1450
1010, 1964 (Fair)	1175
1010, 1964 (Fair)	1050
1010, 1963 (Good)	1575
1010, 1963 (Good)	1850*
1010, 1962 (Good)	1600
830 diesel, 1973 (Good)	3200*
430, 1958 (Good)	1100
420, 1956 (Fair)	700
320, cult., 1957 (Good)	1900
60, 1953 (Rough)	375
40, 1953 (Good)	725
MT, 1950 (Good)	700*

KUBOTA TRACTOR

L245, 1979 (Good)	3100

LONG TRACTOR

360 diesel, (Excellent)	3600

MALONE TRACTOR

G955 diesel, 1973 (Good)	3200*

BILL ENLOW TRACTOR SALES
Tulsa, Okla.
(June 13, 1981)

ALLIS-CHALMERS TRACTORS

WC, 1943 (Good)	325
D-14, 1957 (Fair)	750*
D-14, 1960 (Good)	1500
5040 diesel, 1978 (Good)	4550

CASE TRACTORS

600, 1957 (Fair)	1300
530, backhoe, 1964 (Good)	3850
530, backhoe, 1966 (Good)	4050
930 diesel, 1963 (Good)	2575
930 diesel, 1964 (Good)	2250*
970 diesel, 1973 (Good)	7500*
2870 diesel, 1976 (Good)	16,500*

FERGUSON TRACTORS

20, 1948 (Good)	1375
20, 1948 (Good)	1650
20, 1950 (Fair)	1150
30, 1953 (Good)	1430

FORD TRACTORS

9N, 1939 (Good)	1150
9N, 1940 (Good)	1000
9N, 1942 (Fair)	900
9N, 1945 (Good)	1275
9N, 1946 (Good)	1375
9N, 1946 (Good)	1250
8N, 1947 (Fair)	1100*
8N, 1948 (Fair)	1000
8N, 1948 (Fair)	1175
8N, 1949 (Fair)	1175
8N, 1949 (Good)	1650
8N, 1949 (Good)	1675
8N, 1950 (Good)	1600
8N, 1950 (Good)	1500
8N, 1950 (Good)	1475
8N, 1950 (Good)	1425
8N, 1951 (Good)	1375
8N, 1951 (Good)	1725
8N, 1952 (Good)	1550
8N, 1952 (Good)	1725
8N, 1952 (Good)	1620
8N, 1952 (Good)	1850
NAA, 1953 (Good)	1650
NAA, 1953 (Fair)	1500*
NAA, 1953 (Good)	1700*
600, 1955 (Fair)	1700
600, 1956 (Good)	2000
800, LP, 1954 (Fair)	1550*
800, 1955 (Good)	2175
800, 1955 (Good)	2050
800, 1956 (Fair)	1900*
800, 1956 (Good)	2275
900, 1956 (Good)	1275
Dexta, 1960 (Fair)	1500*
3000, 1966 (Fair)	1900
3000 diesel, 1967 (Fair)	2800
5000 diesel, 1966 (Fair)	3500*
5000 diesel, 1967 (Good)	3800
6000 diesel, 1965 (Fair)	1200*
9600 diesel, (Good)	7000*
1500, 1979 (Good)	3800
4100 diesel, ldr., 1978 (Good)	6500*

INTERNATIONAL HARVESTER TRACTORS

Cub, 1952 (Good)	1400
Cub, 1954 (Good)	1375
Cub, 1957 (Fair)	1125
Cub, Loboy, 1968 (Good)	1500
154 Cub, 1970 (Good)	2350
A, 1945 (Good)	525
C, 1949 (Fair)	400*
M diesel, 1948 (Good)	1000*
Super M, 1951 (Fair)	600
340, 1959 (Good)	1000*
400, 1955 (Good)	1250*
444, 1968 (Good)	2950

JOHN DEERE TRACTORS

A, 1945 (Fair)	200
MT, 1951 (Good)	600
440, ldr., 1958 (Fair)	2000

KUBOTA TRACTOR

L245 diesel, 1975 (Good)	2700

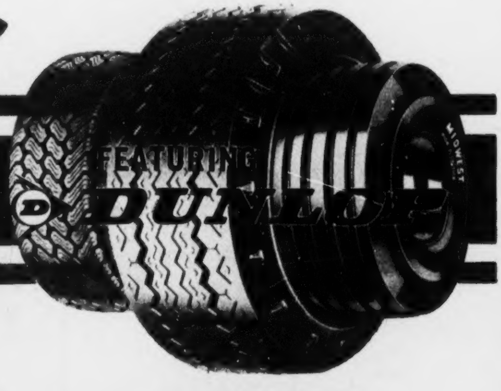
LONG TRACTOR

900 diesel, ldr., 1969 (Good)	2750

MASSEY-FERGUSON TRACTORS

35, ldr., 1962 (Good)	2500*
35 diesel, 1963 (Good)	2950
50 diesel, 1961 (Fair)	1925

(More...)



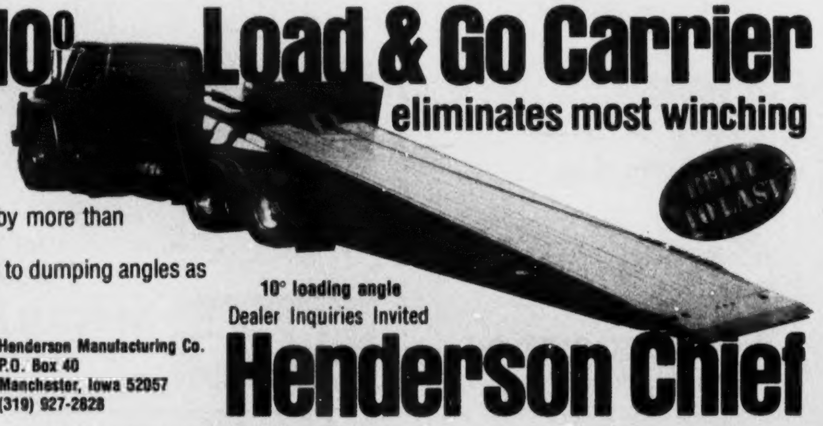
SAVE ON CAR-TRUCK-TRACTOR AND IMPLEMENT TIRES
Supplying stores, dealers, fleets & manufacturers exclusively

WRITE FOR CATALOG
OR CALL TOLL FREE
800-325-7120

MIDWEST TIRE COMPANY OF ST. LOUIS, INC.
2130 Delmar Blvd., St. Louis, Mo. 63103
Phone: (314) 241-0062

OUR 46TH YEAR

Circle (40) on Reply Card



Henderson 10° Load & Go Carrier
eliminates most winching

This heavy duty carrier with full roll back design saves time and simplifies transporting equipment. Rolling equipment can be driven aboard thanks to low 10° loading angle made possible by more than ten feet of roll back.

Double acting cylinders lift the platform to dumping angles as steep as 30°. Safe, one man operation with separate tilt and roll controls. Rugged winch provided for non-rolling loads.

Write for complete information.

Henderson Manufacturing Co.
P.O. Box 40
Manchester, Iowa 52057
(319) 927-2828

10° loading angle
Dealer Inquiries Invited

Henderson Chief

Circle (34) on Reply Card

turbo® Precleaners

The No. 1 PRECLEANER
turbo
turbo
turbo
turbo II
turbo II
turbo II

Eliminates up to 99% of dust, dirt, chaff, rain and snow!

- Extends filter life up to 10 times longer.
- Extends engine life.
- No exhaust connections.

Traffic stopping display moves precleaners off the shelf.

- Free merchandising aids.
- Advertising in leading farm publications.
- Full one year or 3,000 hour warranty.

SURECO

4701 HUMBOLDT AVE. NO., MINNEAPOLIS, MN 55430
PHONE (612) 529-9166

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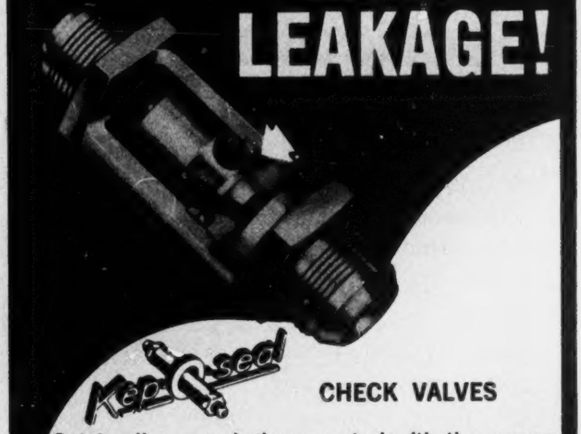
ZERO LEAKAGE!



CHECK VALVES

Outstanding zero leakage control with the proven Flexible Seal Seat*. Kep-O-Seal Valves handle dirt without damage or loss of positive sealing action. Rugged design, long service life, easy field maintenance, controlled quality assured. ⅛" - 2" full pipe flow. Standard ratings to 5000 psi. Specials to 10,000 psi.
Pre-set cracking pressures available.

*patented

KEPNER PRODUCTS COMPANY

995 N. Ellsworth Avenue, Villa Park, IL 60181 • 312-279-1550 • Telex: 27-0081

Circle (37) on Reply Card

Auctions (continued)

50, 1962 (Good)	2250*
65, 1963 (Good)	3000
65, 1964 (Rough)	1550
Super 90, 1960 (Fair)	1925
135, 1969 (Good)	3275
150, 1966 (Fair)	1750
165, 1967 (Good)	2800*
165 diesel, 1971 (Good)	3850
175 diesel, 1966 (Rough)	2500
175 diesel, 1966 (Fair)	2635
180 diesel, 1969 (Good)	3500
1100 diesel, 1968 (Rough)	3200*
230 diesel, 1980 (New)	6950*
40, ldr., 1967 (Rough)	1875
202, 1969 (Good)	2575*
302, ldr., 1967 (Fair)	2350

MINNEAPOLIS-MOLINE TRACTOR

G 900 diesel, 1968 (Fair)	2700*

OLIVER TRACTORS

1600 diesel, 1963 (Fair)	2400*
1800 diesel, 1962 (Fair)	2600*

YODER & FREY, INC.
Archbold, Ohio
(June 9, 1981)

ALLIS-CHALMERS TRACTORS

7030 diesel, 1974 (Fair)	8250*
7000 diesel, 1976 (Good)	7750*
440 diesel, (Rough)	6800
XT190 diesel, 1967 (Fair)	5000*
XT190 diesel, 1967 (Fair)	4800*
160, ldr., 1966 (Fair)	4200*
D19, 1964 (Fair)	2200*
D15, 1958 (Rough)	1050
WD45, 1950 (Fair)	950
WD45, 1950 (Fair)	910
G, 1946 (Fair)	1025*
C, mo., 1950 (Good)	1200

DAVID BROWN TRACTORS

4600, ldr., 1965 (Good)	2700*
995, 1976 (Good)	4200*
995, 1972 (Good)	3250*

CASE TRACTORS

1370 diesel, 1974 (Good)	11,500*
1370 diesel, 1971 (Fair)	8100*
1030 diesel, 1966 (Good)	4100*
1030 diesel, 1966 (Good)	3500
730, 1964 (Fair)	2000
600, ldr., 1956 (Good)	1400*
430 diesel, 1956 (Rough)	1600*

JOHN DEERE TRACTORS

8630 diesel, 1975 (Good)	30,000*
4440 diesel, 1960 (Excellent)	26,000*
4430 diesel, 1974 (Excellent)	15,250*
4430 diesel, 1974 (Good)	14,250*
5020 diesel, 1968 (Good)	6250*
4030 diesel, 1973 (Fair)	12,500
4020 diesel, 1966 (Fair)	6200
4020 diesel, 1967 (Good)	5000
4020 diesel, 1967 (Good)	5000
4010 diesel, 1962 (Good)	4175
4010 diesel, 1961 (Rough)	3900
2130, 1975 (Good)	5800*
2030 ldr., 1974 (Excellent)	6075
2020, ldr., 1965 (Fair)	2650
2010, 1958 (Fair)	2350
2010, 1961 (Rough)	1375
830 diesel, 1957 (Rough)	2000*
730 diesel, 1957 (Fair)	2100*
620, 1957 (Fair)	1500
430, 1954 (Rough)	1000
70, 1953 (Fair)	1000*
60, 1956 (Fair)	820
A, 1947 (Rough)	450
B, 1947 (Fair)	625
B, 1947 (Good)	975
LA, plant., cult., mo., (Good)	1000

FORD TRACTORS

9600, (Fair)	8500
8000, 1971 (Rough)	4700*
7000 diesel, 1972 (Good)	7000
5000, ldr., 1972 (Good)	4550
5000, ldr., 1964 (Good)	2825
4100 diesel, 1977 (Good)	6200
4000, 1971 (Good)	3400*
4000, (Rough)	1325
3600 diesel, 1975 (Excellent)	5000
3000, ldr., (Good)	2450*
600, 1956 (Rough)	1500
Maj., 1956 (Fair)	1125
NAA, 1955 (Fair)	1950
Dexta, 1951 (Fair)	1175*
8N, 1950 (Fair)	1200
8N, 1947 (Fair)	1050
8N, 1950 (Rough)	800
9N, ldr., 1946 (Fair)	1050
9N, ldr., 1946 (Fair)	900
9N, ldr., 1945 (Fair)	860
9N, 1945 (Fair)	775
9N, 1943 (Fair)	850
9N, 1942 (Fair)	725
9N, 1942 (Fair)	725

INTERNATIONAL HARVESTER TRACTORS

1566 diesel, 1974 (Good)	12,500*
1466 diesel, 1976 (Good)	12,250*
2400, 1969 (Good)	2650
966 diesel, 1974 (Good)	7300*
966 diesel, 1972 (Fair)	7250*
856 diesel, 1968 (Fair)	7100*
806 diesel, 1964 (Fair)	4100*
806, 1964 (Fair)	2700
766 diesel, 1972 (Rough)	7900*
656, 1968 (Fair)	3150
656, 1967 (Fair)	2400*
650 diesel, 1957 (Fair)	1050
560 diesel, 1956 (Rough)	2600
504, 1964 (Fair)	1600*
454, ldr., 1973 (Fair)	4000*
450, 1957 (Good)	1290
400, 1955 (Rough)	600
240, ldr., 1960 (Excellent)	11,500*
Sup. M, 1951 (Good)	1450
Sup. M, 1950 (Rough)	775
M, (Good)	1160
M, 1949 (Fair)	785
M, 1949 (Fair)	725
M, 1948 (Rough)	650
H, cult., 1949 (Fair)	1000
Sup. A, 1952 (Fair)	1100*
A, plow, cult., 1950 (Fair)	1200
A, 1951 (Good)	685
A, 1950 (Fair)	600
C, cult., 1948 (Rough)	710
Cub, cult., 1950 (Fair)	1050*

MASSEY-FERGUSON TRACTORS

2135 diesel (Rough)	2025
1085 diesel, 1977 (Good)	6900*
255, 1971 (Fair)	5600*
175, 1968 (Good)	3700
165, 1968 (Good)	3500
165, 1962 (Fair)	2950*
135, ldr., 1967 (Fair)	2400*
Sup. 90, 1956 (Good)	2500
50, 1957 (Fair)	2200

MINNEAPOLIS-MOLINE TRACTORS

G1000G, 1966 (Good)	3350
Jet Star 3, 1955 (Fair)	1825

OLIVER TRACTORS

1850, 1965 (Fair)	3200
1800, 1963 (Rough)	3100*
1800, 1962 (Good)	3500
1800, 1961 (Fair)	2300*
1755, (Rough)	4400*
1650, 1965 (Fair)	3200*
880 diesel, 1950 (Good)	1075
88, 1949 (Fair)	650
77, 1949 (Fair)	650
Sup. 55, 1956 (Rough)	1100*
Sup. 55, 1956 (Fair)	1350

C 4125 1

August 21, 1981
TWO DOLLARS

Serving the Farm and Industrial Equipment Industry Since 1886

Implement & Tractor

Seven steps this dealer took to increase sales

page 18

Lease-Oriented Deals Generate Sales page 10

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P.O. Box 12901
Overland Park, Kan. 66212
(a suburb of Kansas City, Mo.)
Telephone (913) 888-4664
Telex: 42-4156; Answerback
Intertec OLPK

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INTERTEC PUBLISHING CORP.

August 21, 1981 • Vol. 96 • No. 17

Implement & Tractor

The Business Magazine of the Farm and Industrial Equipment Industry

in this issue...

10: **Lease-Oriented Deals.** Some dealers are turning to leasing programs to meet customer needs and generate profits from equipment sales to captive and commercial lessors.

14: **Ag Engineers Ponder Potter...**Robert J. Potter, International Harvester's chief technical officer, spoke on agricultural energy sources at the Summer Meeting of the American Society of Agricultural Engineers.

18: **Seven Steps This Dealer Took to Increase Sales.** Dealer Wayne Buck learned it takes creativity, redirected efforts and more accurate targeting of customer potential to generate sales and profits in today's farm and industrial equipment market. Second of two parts on coping creatively with an economic slowdown.

22: **Five Questions About Computers.** Ron Stallings, a dealer-turned-management specialist, talks about the most frequently asked questions concerning in-house computer setups.

On the cover... At Buck & Sons Tractor Co., Tacoma, Wash., service manager Jerry Ringman, left, and dealer Wayne Buck check out a new Kubota tractor for their growing "weekend warrior" (part-time farmer) market.

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BEST AVAILABLE COPY

RETAIL SALES OF WHEEL TRACTORS*
(In Units)

	Total Wheel Tractors†				Cumulative for Jan.-May, 1980				Cumulative for Jan.-May, 1981			
	May, 1980		May, 1981		Farm Type				Farm Type			
	Farm	Non-Farm	Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm
Alabama	219	41	140	33	1,090	36	1,126	175	795	18	813	143
Alaska	9	8	2	5	8	5	13	11	11	.....	11	20
Arizona	112	33	39	23	375	47	422	198	294	26	320	152
Arkansas	267	46	199	36	1,464	186	1,650	234	1,142	164	1,306	154
California	317	203	306	170	1,744	131	1,875	1,099	1,707	178	1,885	950
Colorado	98	51	90	38	411	86	497	253	424	93	517	204
Connecticut	26	11	16	10	109	3	112	85	71	2	73	59
Delaware	15	5	15	2	79	4	83	15	54	2	56	11
Florida	217	79	164	90	941	29	970	506	948	24	972	465
Georgia	307	54	207	44	1,430	27	1,457	205	1,089	12	1,101	236
Hawaii	8	7	4	15	25	.....	25	50	27	4	31	37
Idaho	82	9	114	12	409	42	451	63	598	98	696	69
Illinois	455	63	369	58	2,082	349	2,431	315	1,868	334	2,202	297
Indiana	279	42	247	43	1,221	200	1,421	219	1,018	159	1,177	163
Iowa	346	50	429	32	2,489	258	2,747	141	2,444	284	2,728	94
Kansas	322	26	233	21	1,255	294	1,549	158	896	195	1,091	136
Kentucky	433	76	298	33	1,712	39	1,751	178	1,536	26	1,562	206
Louisiana	252	41	237	69	1,131	121	1,252	254	1,180	114	1,294	313
Maine	31	3	29	5	82	2	84	48	101	3	104	29
Maryland	78	30	64	43	319	23	342	126	226	15	241	164
Massachusetts	17	22	15	24	51	.....	51	101	57	.....	57	109
Michigan	229	64	299	52	914	94	1,008	339	1,026	157	1,183	279
Minnesota	331	26	372	33	1,527	280	1,807	172	1,787	292	2,079	133
Mississippi	293	29	227	17	1,481	124	1,605	135	1,094	93	1,187	130
Missouri	347	45	361	46	1,611	127	1,738	265	1,276	124	1,400	201
Montana	120	18	96	10	457	129	586	92	340	113	453	62
Nebraska	197	10	274	13	1,465	183	1,648	71	1,222	126	1,348	55
Nevada	15	8	3	9	50	7	57	51	43	6	49	50
New Hampshire	7	2	15	9	45	.....	45	30	35	.....	35	37
New Jersey	27	37	22	50	131	1	132	192	97	.....	97	177
New Mexico	38	20	27	11	194	10	204	89	151	14	165	105
New York	239	98	280	63	911	38	949	374	892	74	966	299
North Carolina	352	47	193	41	1,524	20	1,544	262	1,193	16	1,209	227
North Dakota	139	17	218	9	606	344	950	55	761	375	1,136	30
Ohio	341	71	311	56	1,580	164	1,744	345	1,289	161	1,450	282
Oklahoma	210	50	250	46	911	139	1,050	232	788	107	895	294
Oregon	103	21	137	33	474	33	507	171	457	46	503	144
Pennsylvania	219	82	197	85	867	27	894	432	815	34	849	368
Rhode Island	1	3	5	.....	6	.....	6	21	10	.....	10	16
South Carolina	160	34	87	30	716	24	740	133	465	12	477	143
South Dakota	87	10	94	5	624	109	733	43	537	113	650	28
Tennessee	345	21	276	21	1,351	45	1,396	159	1,132	31	1,163	134
Texas	858	248	800	294	3,762	248	4,010	1,489	3,549	205	3,754	1,476
Utah	63	20	63	14	235	14	249	131	274	14	288	119
Vermont	32	7	32	5	96	.....	96	13	115	1	116	23
Virginia	232	38	163	37	926	14	940	258	677	10	687	190
Washington	150	44	139	44	718	68	786	204	580	80	660	152
West Virginia	62	54	42	9	183	.....	183	91	140	.....	140	56
Wisconsin	438	26	509	38	1,815	100	1,915	195	1,778	115	1,893	171
Wyoming	36	8	35	12	136	16	152	67	171	18	189	82
U.S. Government	8	60	2	4	51	.....	51	356	6	.....	6	37
Miscellaneous‡	48	126	2	88	178	.....	178	361	97	.....	97	313
TOTAL	**9,617**	**2,244**	**8,748**	**1,990**	**43,972**	**4,240**	**48,212**	**11,262**	**39,283**	**4,088**	**43,371**	**9,826**

Data released July 21, 1981, Farm & Industrial Equipment Institute.

*Figures do not include garden tractors, motor tillers or contractors off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland Satoh); Allis-Chalmers; Belarus; J I Case; Deere; Deutz; Ford; International Harvester; Long; Massey-Ferguson; R. M. Wade (Satoh); Steiger; Versatile; and White.

†The monthly sales are those reported for that month only. The cumulative totals are subject to revision reflecting updating in the basic sales data.

‡Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

I&T
SINCE 1886

AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

JONES FARM EQUIPMENT CO.
Dothan, Alabama
(July 14, 1981)

ALLIS-CHALMERS TRACTORS

7580 diesel, cab, duals, 1977 (Good)	18,500*
7080 diesel, duals, 1978 (Good)	17,000*
7040 diesel, cab, duals, 1977 (Good)	10,500*
5040 diesel, 1978 (Excellent)	4900*
XT190 diesel, series III, duals, 1969 (Excellent)	4000*
185 diesel, 1972 (Good)	3900
160 diesel, 1972 (Fair)	2900*
160 diesel, 1972 (Rough)	2350
D15 diesel, 1964 (Fair)	800

CASE TRACTORS

1070 diesel, 1970 (Fair)	3750*
580C diesel, ldr., 1977 (Fair)	3200
580C diesel, 1977 (Fair)	3600

DEUTZ TRACTORS

9006 diesel, (Good)	4400*
5505 diesel, (Rough)	1200*

DAVID BROWN TRACTORS

1212 diesel, 1974 (Good)	3250*
990 diesel, 196[illegible] (Good)	2000*
770 diesel, 1966 (Good)	1700*

MASSEY-FERGUSON TRACTORS

1135 diesel, 1974 (Good)	6250
1105 diesel, 1976 (Good)	6450*
1105 diesel, 1973 (Good)	5150*
1105 diesel, 1973 (Fair)	4000
1100 diesel, 1968 (Fair)	2950
1100 diesel, 1966 (Rough)	1600
1080 diesel, 1972 (Rough)	2400*
285 diesel, 1976 (Good)	5600
275 diesel, 1976 (Good)	5750
275 diesel, 1976 (Good)	6050
275 diesel, 1976 (Excellent)	6800
265 diesel, 1979 (Excellent)	8200
265 diesel, 1976 (Fair)	4700*
245 diesel, 1978 (Excellent)	6150
245 diesel, 1977 (Excellent)	6500*
230 diesel, 1979 (Excellent)	6700*
202, ldr., 1962 (Fair)	1150
180 diesel, 1966 (Good)	3250*
180 diesel, 1966 (Good)	3500*
175 diesel, 1973 (Good)	3950
175 diesel, 1968 (Good)	3400
175 diesel, 1968 (Fair)	3150
165 diesel, 1971 (Fair)	3375
165 diesel, 1971 (Rough)	2250
165 diesel, 1967 (Fair)	3050*
165 diesel, 1967 (Rough)	1575
165 diesel, 1967 (Rough)	1800
135 diesel, 1971 (Good)	2950*
135 diesel, 1968 (Good)	3300
65 diesel, 1963 (Fair)	1600
65 diesel, 1962 (Good)	2200*
[illegible]0A diesel, ldr., backhoe, 1974 (Good)	4500
50 diesel, 1964 (Good)	1800
50 diesel, 1962 (Good)	1900*
35 diesel, 1963 (Good)	1950
35 diesel, 1962 (Good)	2350
35 diesel, 1961 (Good)	2100
TO30, 1953 (Fair)	700
TO20, 1949 (Fair)	675

FORD-FERGUSON TRACTORS

9N, 1946 (Good)	1000
9N, 1944 (Fair)	675

FORD TRACTORS

8600 diesel, cab, 1974 (Fair)	4950*
8000 diesel, 1972 (Fair)	4300
8000 diesel, 1969 (Fair)	3850*
7700 diesel, cab, 1976 (Excellent)	14,000
7000 diesel, 1974 (Good)	5700*
6700 diesel, 1977 (Good)	8050
5000 diesel, 1975 (Rough)	2250
5000 diesel, 1971 (Excellent)	5200
5000 diesel, Log Hog, 1969 (Rough)	2000*
4000 diesel, 1966 (Good)	3050*
4000, ldr., 1963 (Good)	2000
3600 diesel, 1976 (Good)	5200
3000 diesel, 1972 (Fair)	3250
3000 diesel, 1972 (Fair)	3550*
3000 diesel, 1971 (Good)	3600
3000, 1967 (Rough)	1700
2600 diesel, 1978 (Fair)	3250
2600, 1978 (Excellent)	6050
2000 diesel, 1963 (Good)	1600*
871, 1961 (Good)	1800
861 diesel, 1960 (Good)	2350*
860, 1957 (Good)	1950*
851, 1958 (Good)	1700*
850, 1955 (Good)	2150
841 diesel, 1959 (Good)	1975
641, 1959 (Good)	1950*
640, 1956 (Good)	1900*
640, 1955 (Good)	2000*
Dextra, 1958 (Good)	1600
NAA, 1954 (Good)	1600
Jub., 1953 (Fair)	1200
8N, 1952 (Excellent)	1700
8N, 1952 (Good)	1400
8N, 1952 (Good)	1375
8N, 1948 (Good)	975
8N, 1948 (Good)	1000
8N, 1948 (Fair)	775

INTERNATIONAL HARVESTER TRACTORS

1486 diesel, 1978 (Excellent)	1500
2500, 1976 (Fair)	2000*
1066 diesel, 1975 (Good)	5750*
686 diesel, 1977 (Good)	6100
674 diesel, 1975 (Good)	3700
656 diesel, 1966 (Good)	3500
574 diesel, 1972 (Fair)	2850*
574 diesel, 1972 (Rough)	1775
424 diesel, 1967 (Good)	1650*
364 diesel, 1976 (Rough)	1650
350, cult., plow, har., 1958 (Fair)	800
284 diesel, 1976 (Fair)	1800*
B275 diesel, 1959 (Good)	1300
100 diesel, hydro, cab, 1975 (Good)	5500
H, 1946 (Good)	385
Sup. C, 1953 (Good)	775*
Cub, 1948 (Fair)	750
Cub, mo., 1948 (Fair)	1050
Cub, mo., 1948 (Good)	1450
Cub, 1948 (Good)	1400*

JOHN DEERE TRACTORS

5020 diesel, duals, 1966 (Good)	5350
4230 diesel, 1974 (Fair)	4500
4020 diesel, 1966 (Rough)	2250
4020 diesel, 1966 (Good)	5500
4020 diesel, 1966 (Rough)	3150
3020 diesel, 1968 (Good)	5400
3020 diesel, 1967 (Fair)	4400
3020 diesel, 1966 (Good)	4900
3010, 1963 (Fair)	2450*
3010 diesel, 1961 (Fair)	2150
2630 diesel, 1975 (Excellent)	5950
2030 diesel, 1973 (Good)	3550
2030 diesel, 1973 (Good)	4500*
2020 diesel, 1967 (Fair)	3225
2020 diesel, 1966 (Good)	3750*
1010, 1962 (Good)	1900*
1010, 1962 (Fair)	1250*
830 diesel, 1975 (Good)	3400
820 diesel, 1968 (Fair)	2000
430, 1960 (Good)	900*
430, 1960 (Good)	1000
300 diesel, ldr., 1969 (Good)	3300*
70, 1955 (Good)	585
G, 1950 (Good)	700
A, 1940 (Rough)	200

LONG TRACTORS

1100 diesel, (Good)	2700
900 diesel, 1968 (Good)	2400
310 diesel, (Excellent)	3900*

LEYLAND TRACTOR

270 diesel, (Good)	1500

MINNEAPOLIS-MOLINE TRACTOR

G955 diesel, 1973 (Fair)	2800

KUBOTA TRACTORS

245 diesel, 1979 (Excellent)	3700*
185 diesel, 1979 (Excellent)	3550*

NOTES

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.

Prices reported are NOT averages.

Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

DEMONSTRATOR means—used for demonstrating only and in practically new condition.

Don't sell too low...

and don't pay too much...

stay up-to-date on used equipment values with I&T SINCE 1886

RETAIL SALES OF SELECTED FARM EQUIPMENT – Jan.-May., 1980 and 1981(1)
(In units)

	Combines Self-Propelled		Corn Heads		Hay Balers(2)		Windrowers Self-Propelled				Grinder-Mixers		Shear-Bar Forage Harvesters(3)	
							Power Units		Total Heads					
	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981
Alabama	50	41	15	5	35	83	2	.....	1	.....	79	46	5	14
Alaska	.....	.....	.....	.....	6	5	.....	.....	.....	.....	.....	1	.....	.....
Arizona	23	43	.....	1	17	29	30	33	38	39	5	2	2	7
Arkansas	115	220	.....	1	68	96	.....	.....	.....	.....	46	30	2	3
California	80	120	6	19	54	81	124	147	141	163	1	3	25	26
Colorado	59	89	28	22	64	58	52	42	57	44	37	37	21	8
Connecticut	.....	.....	.....	.....	16	10	.....	.....	.....	.....	.....	.....	8	6
Delaware	9	6	4	4	2	3	1	1	1	1	6	2	3	1
Florida	17	12	8	8	25	27	.....	.....	.....	.....	24	8	12	5
Georgia	84	100	60	30	38	76	1	.....	1	.....	160	51	22	21
Hawaii	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Idaho	44	103	3	1	97	98	65	76	65	76	31	16	14	11
Illinois	553	553	551	471	72	78	9	7	9	7	293	217	71	74
Indiana	354	284	350	263	63	69	5	2	5	2	219	137	52	34
Iowa	671	550	640	517	68	79	26	45	27	43	722	493	133	93
Kansas	591	553	92	35	110	96	110	102	109	105	140	97	72	32
Kentucky	66	72	36	43	64	80	2	8	2	7	206	116	42	48
Louisiana	56	73	.....	1	14	36	.....	.....	.....	.....	10	5	6	4
Maine	.....	.....	.....	.....	9	9	.....	.....	.....	.....	.....	1	9	5
Maryland	33	17	26	27	29	26	7	1	6	1	19	17	22	13
Massachusetts	.....	.....	.....	.....	7	8	.....	.....	.....	.....	1	.....	3	4
Michigan	110	102	93	76	64	46	9	17	9	16	126	109	83	64
Minnesota	295	333	230	213	177	152	88	110	91	119	331	299	140	122
Mississippi	94	102	1	2	27	55	.....	.....	.....	.....	22	20	15	8
Missouri	236	229	132	66	121	146	18	18	18	19	299	181	30	34
Montana	84	135	2	2	61	42	77	66	77	73	39	23	10	4
Nebraska	359	276	289	175	41	41	89	76	87	80	313	193	68	45
Nevada	1	1	.....	.....	13	6	12	14	15	15	2	2	3	1
New Hampshire	.....	.....	.....	.....	14	12	.....	.....	.....	.....	.....	1	6	2
New Jersey	6	5	7	5	9	7	.....	.....	.....	.....	4	6	5	3
New Mexico	5	17	2	1	35	45	22	20	24	20	7	6	.....	1
New York	30	17	39	27	134	90	13	9	14	10	71	61	147	71
North Carolina	69	54	56	47	72	96	1	.....	1	.....	85	64	18	13
North Dakota	196	295	10	11	14	9	51	74	54	82	73	66	21	10
Ohio	327	223	225	188	110	109	3	2	3	2	242	150	67	57
Oklahoma	180	257	2	1	138	167	33	48	34	50	71	41	9	8
Oregon	35	62	3	2	88	82	44	39	45	59	18	11	10	13
Pennsylvania	38	35	59	29	182	143	14	16	16	15	162	119	123	94
Rhode Island	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Carolina	49	36	19	6	21	33	.....	.....	.....	.....	41	20	11	10
South Dakota	111	104	60	41	22	9	91	70	101	77	198	109	47	36
Tennessee	73	69	36	16	104	170	1	.....	1	.....	111	75	30	40
Texas	271	494	41	51	168	314	22	38	23	48	122	87	32	20
Utah	6	10	1	1	50	42	24	24	24	22	21	7	14	4
Vermont	.....	.....	.....	.....	29	20	1	1	1	1	.....	1	36	13
Virginia	32	26	24	18	115	88	3	2	3	2	59	30	42	31
Washington	66	97	8	8	83	54	46	40	43	46	12	6	29	25
West Virginia	.....	.....	.....	.....	35	35	.....	.....	.....	.....	16	8	2	2
Wisconsin	99	81	126	90	384	291	97	69	97	72	304	255	479	301
Wyoming	10	18	1	3	26	21	19	25	18	26	12	9	3	3
U.S. Government	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous (4)	.....	.....	.....	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL	**5,587**	**5,914**	**3,285**	**2,539**	**3,195**	**3,372**	**1,212**	**1,242**	**1,261**	**1,342**	**4,760**	**3,238**	**2,006**	**1,444**

Data released July 21, 1981, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled.

(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

Mower Conditioners All Types		Manure Spreaders Conveyor-Type		
1980	1981	1980	1981	
40	57	13	8	Alabama
.....	2	.....	2	Alaska
5	7	6	2	Arizona
103	167	61	56	Arkansas
18	27	21	26	California
22	36	40	32	Colorado
20	10	38	40	Connecticut
7	1	43	33	Delaware
21	21	11	12	Florida
87	88	24	15	Georgia
.....	.....	1	.....	Hawaii
23	37	59	58	Idaho
134	191	357	308	Illinois
123	149	271	282	Indiana
220	271	777	753	Iowa
173	201	136	80	Kansas
239	267	180	156	Kentucky
18	27	12	9	Louisiana
19	16	55	32	Maine
28	20	137	87	Maryland
16	12	38	43	Massachusetts
124	106	409	376	Michigan
246	229	698	641	Minnesota
26	41	8	12	Mississippi
440	381	201	150	Missouri
27	38	28	13	Montana
138	132	247	107	Nebraska
2	2	5	2	Nevada
16	14	33	21	New Hampshire
18	4	28	23	New Jersey
4	6	3	4	New Mexico
242	174	740	700	New York
89	84	89	53	North Carolina
17	15	49	41	North Dakota
210	172	486	419	Ohio
203	228	33	17	Oklahoma
50	61	49	41	Oregon
251	156	743	606	Pennsylvania
1	.....	.....	.....	Rhode Island
27	48	20	7	South Carolina
25	24	114	105	South Dakota
192	252	107	79	Tennessee
291	409	82	82	Texas
31	34	70	46	Utah
51	25	115	101	Vermont
263	157	136	82	Virginia
45	55	74	50	Washington
47	29	36	34	West Virginia
567	442	1,141	993	Wisconsin
7	10	27	15	Wyoming
.....	.....	.....	.....	U.S. Government
.....	.....	.....	.....	Miscellaneous
4,966	4,935	8,051	6,854	**TOTAL**

INDUSTRY IN MOTION

Dan A. Holden has been appointed vice-president of human resources and communications for **International Harvester's Agricultural Equipment Group.** He will be responsible for employee relations and internal and external communication activities for the Group's worldwide operations.

Stephen Simpson has been appointed service manager for **Bush Hog,** Selma, Ala., and will be responsible for warranty administration, field service, service training schools and seminars for the complete Bush Hog product line.

Neapco, Inc., has opened a 34,000-sq.-ft. manufacturing facility in Beatrice Industrial Park, Beatrice, Neb., which will be used for manufacturing, distribution, storage, assembly and also as a staging area to complement its facility in Pottstown, Pa.

Ford Tractor Operations has received a contract to supply more than $29 million of farm and industrial equipment to a state government in Mexico for agricultural development and road construction. The equipment order from the State of Mexico includes 1,000 farm tractors, 115 industrial tractors equipped with front loaders and backhoes, and 75 heavy-construction wheel loaders. The farm tractors, all model 6600, will be assembled and partly manufactured in Mexico.

A restructured marketing program has led to the appointment of new key personnel at **Lely Independence Mfg., Inc.,** Independence, Mo.: Gordon Deitch, national accounts manager, western region, and H. R. Morehead, national accounts manager, eastern region. Salesmen assigned include: Dave Bray – Illinois; Steve Fanning – northern Iowa; M. A. Fennewald – Missouri; Don Schlicte – southern Iowa; and Larry Vennum – Nebraska. John Hoffman is the new product development manager. The company manufactures the Clark line of agricultural sprayers and applicators, chemical tanks and liquid manure units.

Computer Questions

(Continued from page 23)

will reduce receivables. You thus have more cash flow and inventory turnover. Also, the computer can give you faster and better data to reduce delinquent accounts. But no computer system can substitute for proper business judgment!

•**D.** Managing with the right computer-based information system, you should be able to expand your business without a large increase in personnel or other costs.

•**E.** A computer-based information system will give you better control when you are not at the dealership. We all want and need to be away from the place now and then, and the computer, properly put into operation, can make it easier for you to leave and return with everything under control.

As a closing footnote: When you buy a computer, it does not necessarily mean you will be dismissing employees. The computer should be used to do the daily time-consuming jobs usually required of employees – leaving them free for more complex or expanded duties. ☐

FARM EQUIPMENT PATENTS

(Copies of patents are available for $.50 each from: Commissioner of Patents & Trademarks, Washington, D.C. 20231. Numbers in parentheses denote the international classification number.)

4,260,321. **Lock Mechanism for Securing a Backhoe Boom and Swing Frame for Transport.** (E02F 3/32) Lynn Beauchamp and LeRoy E. Draske, both of Dubuque, Iowa, assignors to Deere & Co., Moline, Ill.

4,261,161. **Agricultural Machinery Protective System.** (A01D 75/18) David J. Colgrove, Winslow, England; Antoon S. P. Cools, Brugge-St. Kruis, and Eric A. Mortier, Wingene, both of Belgium; assignors to Sperry Corp., New Holland, Pa.

4,261,163. **Method and Apparatus for Harvesting Produce on Plastic Mulch Beds.** (A01D 46/00) Lawrence N. Shaw, 8715 NW. 4th Pl., Gainesville, Fla. 32601.

4,261,400. **Hydraulically Powered Attachment for a Tractor.** (B27L 7/00) David M. Spence, Afton Manor, Freshwater, Isle of Wight, England.

C [illegible] 1

September 7, 1981
TWO DOLLARS

Implement&Tractor

The business magazine of the farm & industrial equipment industry

High interest, reduced sales of new equipment. What are they doing to the used equipment business?

page 10

In the I&T Manufacturers Edition
Selecting the right hose for the job

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P.O. Box 12901
Overland Park, Kan. 66212
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INTERTEC PUBLISHING CORP.

September 7, 1981 • Vol. 96 • No. 18

Implement & Tractor

The business magazine of the farm & industrial equipment industry

in this issue...

10: **PAMI Takes a Look at 10 Cultivators.** Canada's Prairie Agricultural Machinery Institute tested five heavy-duty and five field cultivators and found them O.K. But, each developed some problems.

12: **Testing Machines in the Field—It's Difficult.** Field evaluations of farm equipment must contend with an assortment of variables. But, each test procedure has a common goal—reliability.

18: **High Interest, Reduced New Equipment Sales: What Are They Doing to the Used Equipment Business?** Stilesville, Ind., auction operator Jim Vaughn reports buyers are more conservative, and the supply of used equipment is dwindling, but some new markets are opening for him.

STILESVILLE IMPLEMENT AUCTION INC.

32: **How Many Dealers Have a REAL Marketing Philosophy?** It's a matter of matching up what your potential customers need most that you can supply most readily. Here are some guidelines to follow in determining just what it is you're in business to do.

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what's ahead...

September 7, 1981

FARM TRACTOR RETAIL SALES IN THE U.S. IMPROVED IN JULY, according to the Farm & Industrial Equipment Institute's flash report, rising 14.4 per cent over the unit volume recorded for July 1980. And July of 1980 was one of the few good months of 1980, almost 20 per cent better than July 1979. Most of the July 1981 increase is being attributed by industry watchers to manufacturers' inventory-cutting programs. Here's the full report:

	Unit Retail Sales					
	July			January-July		
	1981	1980	Pct. Change	1981	1980	Pct. Change
Farm Wheel Tractors:						
2-wheel drive						
40-100 hp	5,768	6,191	- 6.8	32,511	36,933	-12.0
Over 100 hp	4,853	3,381	+43.5	24,838	27,287	- 9.0
Total 2-wheel drive	10,621	9,572	+11.0	57,349	64,220	-10.7
4-wheel drive	1,015	603	+68.3	5,765	5,629	+ 2.4
Total Tractors	11,636	10,175	+14.4	63,114	69,849	- 9.6
Combines (S-P)	2,942	2,386	+23.3	10,655	9,487	+12.3
Balers*	3,095	3,098	- 0.1	9,137	9,013	+ 1.4
Forage Harvesters**	857	982	-12.7	3,110	3,775	-17.6
Mower Conditioners	3,367	3,224	+ 4.4	12,868	12,681	+ 1.5

*Bales under 200 lbs. **Shear-bar type.

MEANWHILE, CANADA'S STRONG SALES PICTURE CONTINUES. Farm tractor sales for July were up 16 per cent to 2,507 units and up 4.5 per cent for the first seven months to 16,558. Combine sales were up 47 per cent in June and 95 per cent in July; for the first seven months, they are up 70 per cent to 1,771 units. Reasons offered for the surge: Farmers have money, are thus less restrained by Canada's high interest rates. Crops look good. Prices are up. And the same manufacturers' inventory-cutting programs are available to Canadian as well as U.S. farmers. Western Canadian dealers had been carrying high inventories, but are currently glad they have them.

UNITED STATES FARMER COOPERATIVES have always played a role in retailing farm equipment. A study by the USDA Ag Cooperative Service indicates how much they did in 1979. Of 5,212 co-ops selling production inputs to farmers, 1,940 accounted for farm equipment sales of $405 million, for an average of $2.088 million. This represented an increase of 37 per cent over the volume done in 1977.

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32, 38.

September 21, 1981
TWO DOLLARS

Implement&Tractor

The business magazine of the farm & industrial equipment industry

WHITE
Farm Equipment
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Ralph Witmer's In-House Finance Subsidiary

page 20

NFPEDA Elects
Dale Sinclair
page 8

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September 21, 1981 • Vol. 96 • No. 19

Implement & Tractor

The business magazine of the farm & industrial equipment industry

in this issue...

8: NFPEDA Chooses Regionalization. Meeting in Atlanta, members of the National Farm & Power Equipment Dealers Assn. vote to establish nine regions among the 29 state and regional associations with representatives of each to serve on the Executive Committee.

16: Britain's Royal Show. International Harvester, John Deere and Sperry New Holland received medals from the Royal Agricultural Society for products at this year's show in Kenilworth.

20: Ralph Witmer's In-House Finance Subsidiary. This Ohio dealer established his own finance company to finance sales of his dealership's long-lines, shortlines and farmstead equipment. (Cover story)

26: Leyland Launches North American Comeback Effort. With a revamped tractor line and a North American headquarters and warehouse, the British firm assures dealers it's here to stay.

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RETAIL SALES OF SELECTED FARM EQUIPMENT – Jan.-June, 1980 and 1981(1)
(In Units)

	Combines Self-Propelled		Corn Heads		Hay Balers(2)		Windrowers Self-Propelled Power Units		Windrowers Self-Propelled Total Heads		Grinder-Mixers		Shear-Bar Forage Harvesters(3)	
	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981
Alabama	81	64	17	12	69	108	2	.....	1	.....	86	54	6	19
Alaska	.....	.....	.....	.....	7	10	.....	.....	.....	.....	1	1	.....	.....
Arizona	32	54	.....	1	25	38	39	36	48	42	5	2	5	7
Arkansas	158	263	.....	1	116	156	.....	2	.....	2	47	30	3	8
California	118	187	7	21	87	108	161	182	180	203	2	4	30	30
Colorado	100	114	33	28	136	143	92	82	99	66	39	41	28	10
Connecticut	.....	.....	.....	.....	28	22	.....	.....	.....	.....	.....	.....	8	10
Delaware	11	11	5	8	4	5	1	1	1	1	7	4	5	1
Florida	21	16	13	9	31	36	.....	.....	.....	.....	27	10	13	7
Georgia	140	187	83	48	81	105	1	.....	1	.....	170	59	30	27
Hawaii	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Idaho	58	135	7	1	216	226	150	134	152	135	34	18	26	20
Illinois	636	658	613	556	154	129	10	8	10	9	306	233	94	92
Indiana	399	331	400	316	129	134	6	3	6	3	225	146	75	49
Iowa	744	622	724	609	127	155	66	76	66	86	747	540	180	147
Kansas	816	743	106	47	168	151	169	144	170	150	145	103	86	45
Kentucky	83	105	45	63	163	141	3	22	3	23	212	122	51	61
Louisiana	68	85	1	1	20	57	.....	.....	.....	.....	12	5	9	4
Maine	2	2	.....	.....	20	25	.....	.....	.....	.....	.....	1	12	10
Maryland	41	26	41	36	48	43	8	1	7	1	25	18	28	21
Massachusetts	.....	.....	.....	.....	16	14	.....	.....	.....	.....	1	.....	4	6
Michigan	120	118	101	97	124	96	23	25	23	24	148	119	116	102
Minnesota	335	418	261	265	308	296	191	197	197	213	350	318	228	203
Mississippi	126	139	1	2	35	66	.....	.....	.....	.....	24	21	18	9
Missouri	303	337	151	89	238	269	29	28	30	29	324	195	39	43
Montana	120	176	2	2	100	92	120	143	127	162	42	24	11	6
Nebraska	417	354	330	227	75	98	153	130	156	138	327	208	94	75
Nevada	1	1	.....	.....	17	14	23	20	26	20	2	2	7	4
New Hampshire	.....	.....	.....	.....	21	20	.....	.....	.....	.....	.....	2	7	6
New Jersey	7	5	7	5	16	12	.....	.....	.....	.....	4	6	6	4
New Mexico	10	24	2	1	54	72	29	24	31	24	8	6	.....	1
New York	33	18	51	38	251	193	26	23	27	24	76	66	208	148
North Carolina	96	89	80	68	160	144	2	.....	2	.....	91	70	22	17
North Dakota	251	377	13	12	17	26	83	151	89	176	82	70	26	23
Ohio	362	258	262	214	208	180	4	6	4	6	246	163	90	85
Oklahoma	306	369	4	1	215	266	58	63	64	65	78	43	13	10
Oregon	51	84	3	4	157	136	106	70	109	92	19	11	15	18
Pennsylvania	49	39	69	33	307	262	28	28	30	27	180	129	176	130
Rhode Island	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	1	.....
South Carolina	65	66	27	16	37	43	.....	.....	.....	.....	43	21	11	11
South Dakota	148	131	67	47	32	29	152	138	166	150	207	114	58	50
Tennessee	109	96	47	15	271	275	1	1	1	1	122	84	36	43
Texas	418	684	69	80	304	530	39	55	44	68	127	95	41	31
Utah	7	12	1	1	134	110	47	53	46	55	21	7	18	12
Vermont	.....	.....	.....	.....	45	41	1	3	1	3	.....	1	46	27
Virginia	42	37	31	25	231	159	4	5	4	5	61	36	58	40
Washington	99	146	9	10	178	136	87	64	82	72	12	6	49	39
West Virginia	.....	.....	.....	.....	68	67	.....	.....	.....	.....	17	8	2	4
Wisconsin	105	108	139	110	620	541	184	124	182	122	325	272	696	533
Wyoming	13	21	1	3	46	63	56	56	57	58	13	10	6	5
U.S. Government	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous (4)	.....	3	.....	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL	**7,101**	**7,713**	**3,824**	**3,134**	**5,916**	**6,042**	**2,154**	**2,098**	**2,242**	**2,275**	**5,042**	**3,498**	**2,793**	**2,253**

Data released August 21, 1981, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled.

(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

Mower Conditioners All Types		Manure Spreaders Conveyor-Type		
1980	1981	1980	1981	
77	100	13	10	Alabama
1	7	.....	2	Alaska
6	11	6	2	Arizona
221	290	66	58	Arkansas
24	32	24	28	California
60	68	47	34	Colorado
44	23	44	42	Connecticut
10	5	43	33	Delaware
24	32	15	14	Florida
137	128	24	15	Georgia
.....	.....	1	.....	Hawaii
54	79	65	61	Idaho
296	311	377	335	Illinois
242	275	295	305	Indiana
479	539	814	813	Iowa
303	317	139	88	Kansas
484	541	197	177	Kentucky
23	45	16	12	Louisiana
33	38	61	40	Maine
53	42	145	95	Maryland
25	21	45	46	Massachusetts
263	205	456	396	Michigan
471	505	754	699	Minnesota
40	54	8	14	Mississippi
735	792	217	165	Missouri
41	83	31	14	Montana
242	250	262	119	Nebraska
2	3	5	2	Nevada
33	30	38	23	New Hampshire
28	12	31	25	New Jersey
9	8	3	4	New Mexico
475	409	754	764	New York
143	131	92	64	North Carolina
29	80	57	43	North Dakota
389	328	515	445	Ohio
344	371	37	19	Oklahoma
124	96	63	45	Oregon
452	353	786	640	Pennsylvania
2	1	.....	.....	Rhode Island
45	71	21	9	South Carolina
30	47	126	116	South Dakota
370	470	121	86	Tennessee
596	767	93	91	Texas
75	90	76	51	Utah
84	61	135	111	Vermont
464	291	148	91	Virginia
127	105	84	54	Washington
95	74	38	38	West Virginia
1,141	887	1,232	1,098	Wisconsin
14	23	28	17	Wyoming
.....	.....	.....	.....	U.S. Government
.....	.....	.....	.....	Miscellaneous
9,459	**9,501**	**8,688**	**7,454**	**TOTAL**

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I&T
SINCE 1886

AUCTION PRICES OF USED EQUIPMENT

An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.

Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.

JONES FARM EQUIPMENT CO.
Dothan, Alabama
August 11, 1981

ALLIS-CHALMERS TRACTORS

7580 diesel, cab, duals, 1977 (Good)	11,500*
7080 diesel, cab, 1978 (Good)	13,500*
7070 diesel, cab, 1978 (Good)	13,250*
7045 diesel, 1978 (Good)	12,700
7040 diesel, cab, duals, 1977 (Good)	9200*
7020 diesel, cab 1978 (Good)	11,250
160, 1972 (Fair)	2900
WD, 1951 (Fair)	325*
B, 1947 (Good)	500
C, 1946 (Fair)	300

CASE TRACTORS

1830 diesel, ldr., 1975 (Good)	3000*
1070 diesel, 1975 (Fair)	3200*
970 diesel, 1975 (Good)	5000*
970 diesel, 1971 (Fair)	4400*
850 diesel, 1973 (Good)	9000

DEUTZ TRACTORS

1006 diesel, 1975 (Good)	3700
6006 diesel, 1972 (Fair)	2350

DAVID BROWN TRACTORS

990 diesel, 1968 (Good)	2350*
770 diesel, 1966 (Good)	1900

MASSEY-FERGUSON TRACTORS

1135 diesel, cab, 1974 (Good)	6750
1105 diesel, 1976 (Good)	5700*
1080 diesel, 1972 (Good)	4200
245 diesel, 1979 (Excellent)	6750
180 diesel, 1967 (Good)	3700
180 diesel, 1966 (Good)	3450
180 diesel, 1966 (Fair)	2750
180 diesel, 1966 (Good)	3350
175 diesel, 1969 (Rough)	2250
165 diesel, 1973 (Excellent)	4200
165 diesel, 1971 (Good)	3250*
165 diesel, 1967 (Good)	3250*
165 diesel, 1967 (Good)	3000
135, 1970 (Good)	3200*
135 diesel, 1967 (Fair)	2050*
135, 1966 (Good)	3000
135 diesel, 1966 (Fair)	2300*
65 diesel, 1963 (Good)	2150
65 diesel, 1963 (Excellent)	2450
65 diesel, 1963 (Good)	2275
65 diesel, 1960 (Fair)	1400
50, 1959 (Fair)	1450
50, 1959 (Good)	2150*
35, 1956 (Good)	1575
35, 1956 (Good)	1650
TO30, 1954 (Rough)	650
TO30, 1953 (Good)	1275
TO20, 1948 (Good)	1000*

FORD-FERGUSON TRACTOR

9N, 1946 (Good)	900

FORD TRACTORS

8600 diesel, 1974 (Fair)	6050
7700 diesel, 1978 (Excellent)	14,000
7600 diesel, 1979 (Good)	7000
7000 diesel, 1974 (Good)	6200
7000 diesel, 1974 (Excellent)	6900*
5000 diesel, 1969 (Excellent)	5500*
5000 diesel, 1967 (Good)	4300
5000 diesel, 1966 (Rough)	1500
4400 diesel, duals, 1970 (Fair)	3150*
3400 diesel, ldr., 1971 (Good)	2400
3400 diesel, ldr., 1969 (Good)	2400
3400 diesel, 1966 (Rough)	1350
3000 diesel, 1973 (Good)	3500
3000 diesel, 1971 (Good)	3250
3000 diesel, 1967 (Fair)	2650*
2000 diesel, 1966 (Good)	2650
2000, 1963 (Good)	2300
871 diesel, Select-O-Speed, 1958 (Good)	1450*
851 diesel, 1958 (Good)	2250
851, 1958 (Good)	1600*
850, 1956 (Good)	2300*
641, 1958 (Good)	1800*
640, 1957 (Excellent)	2500
640, 1956 (Good)	1900
640, 1956 (Good)	1900
Sup. Dexta, 1963 (Good)	1800
Dexta, 1959 (Good)	1100*
NAA, 1954 (Good)	1600
Naa, 1954 (Good)	1600
Jub., 1953 (Fair)	1050*
Jub., 1953 (Good)	1575
Jub., 1953 (Fair)	1250
8N, 1952 (Rough)	750
8N, 1952 (Excellent)	1350
8N, 1951 (Good)	900
8N, 1950 (Excellent)	1475
8N, 1950 (Good)	1200
8N, 1949 (Rough)	775
8N, 1949 (Good)	1200*
8N, 1948 (Good)	1000*
8N, 1948 (Rough)	775

INTERNATIONAL HARVESTER TRACTORS

1586 diesel, cab, duals, 1976 (Excellent)	15,200
2504 diesel, 1966 (Fair)	1075
424, 1967 (Good)	1750
424 diesel, 1965 (Excellent)	2400
424 diesel, 1965 (Excellent)	2200
284 diesel, 1976 (Fair)	1700
275 diesel, 1958 (Good)	1550
Sup. C, cult., 1952 (Fair)	500*
Sup. C, 1952 (Fair)	400
A, 1940 (Good)	500
Cub Loboy, mo., 1968 (Good)	1250
Cub Loboy, mo., 1968 (Good)	1250
Cub, cult., mo., 1963 (Good)	1350*

JOHN DEERE TRACTORS

4430 diesel, cab, 1976 (Good)	14,250
4430 diesel, 1973 (Fair)	8000*
4020 diesel, 1969 (Good)	5350
4020 diesel, 1968 (Good)	5800
4020 diesel, 1965 (Excellent)	6550
3020 diesel, 1968 (Excellent)	6000*
3010 diesel, 1963 (Good)	2800
3010 diesel, 1963 (Rough)	950
3010 diesel, 1963 (Good)	3100*
3010 diesel, 1963 (Fair)	2200*
2240, 1976 (Good)	5050
2040, 1977 (Good)	5200*
2030 diesel, 1974 (Excellent)	5100*
2030, 1974 (Good)	3800*
2020 diesel, 1966 (Good)	3900*
2010 diesel, 1963 (Good)	1650
2010 diesel, ldr., backnoe, 1963 (Rough)	1450
1020 diesel, 1967 (Good)	2800*
1020, 1967 (Fair)	2200
1010, 1963 (Good)	1900
1010 diesel, 1963 (Good)	1500*
730 diesel, 1959 (Good)	1050
440 diesel, ldr., 1958 (Fair)	1600
430, 1960 (Good)	1300*
310 diesel, ldr., backhoe, 1975 (Excellent)	7000*
40, cult., har., 1953 (Fair)	650*
A, 1952 (Good)	500

KUBOTA TRACTORS

L210, mo., (Good)	1900
185 diesel, 1979 (Excellent)	3600
185 diesel, turbo, 1979 (Excellent)	3700*

LONG TRACTOR

460 diesel, 1976 (Good)	2900*

LEYLAND TRACTORS

384 diesel, (Fair)	1750
270 diesel, (Good)	1850*
255 diesel, (Good)	1850

OLIVER TRACTORS

1850 diesel, 1967 (Fair)	3200*
77, 1955 (Good)	435
55 diesel, 1955 (Good)	925

YODER & FREY, INC.
Archbold, Ohio
(August 11, 1981)

ALLIS-CHALMERS TRACTORS

7060 diesel, 1975 (Good)	8600*
XT190, 1970 (Fair)	4250*
190, ldr., 1967 (Fair)	4075
160 diesel, (Good)	4250*
160 diesel, 1969 (Fair)	2350*
D17, 1964 (Good)	2050
D17 diesel, 1964 (Fair)	1700
D17, 1964 (Rough)	1400
WD45, ldr., 1954 (Rough)	600
WD45, 1952 (Fair)	675*
WD45, 1952 (Fair)	650
WD, ldr., 1949 (Rough)	700
CA, 1951 (Fair)	700*

DAVID BROWN TRACTORS

4600, ldr., (Fair)	1700*
1210 diesel, (Fair)	5400
1200 diesel, (Fair)	2800
995, (Fair)	3150
990, (Fair)	2450*
990, 1969 (Fair)	1200*

CASE TRACTORS

1070 diesel, 1972 (Fair)	6800*
1030 diesel, 1966 (Rough)	4300*
1030 diesel, 1965 (Fair)	4000*
830, 1964 (Fair)	1400*
800, (Rough)	650
450 dozer, (Fair)	6250
430, 1962 (Rough)	1560
400, 1958 (Rough)	1300*
350 dozer, (Good)	11,700*
310, (Fair)	3500

JOHN DEERE TRACTORS

4520 diesel, 1970 (Good)	13,100*
4520 diesel, 1970 (Rough)	7750*
4440 diesel, 1980 (Excellent)	29,500
4430 diesel, 1979 (Good)	15,500
4430 diesel, 1975 (Good)	11,500
4320 diesel, 1971 (Rough)	8250
4020, 1968 (Good)	4300*
4020 diesel, 1967 (Good)	7700*
4020 diesel, 1967 (Fair)	7100*
4020 diesel, 1967 (Fair)	7200*
4020 diesel, 1967 (Fair)	6500*
4020, 1967 (Fair)	3600*
4020 diesel, 1966 (Good)	6150
4010, 1963 (Rough)	2300*
4010 diesel, 1962 (Rough)	3400
3010, 1963 (Fair)	2700
3010, 1963 (Rough)	2350
3010, 1962 (Rough)	1900
2510, 1964 (Good)	3100*
2510, 1963 (Good)	3000*
2020, ldr., 1970 (Good)	4750*
730, 1958 (Rough)	1650
630, 1958 (Good)	1600*
620, 1958 (Fair)	1100*
620, 1957 (Fair)	1150*
530, 1959 (Fair)	1325*
420, 1957 (Rough)	1100*
40, 1953 (Fair)	1150
40, 1953 (Fair)	1025
R, 1950 (Fair)	1000*
A, 1951 (Fair)	650*
A, 1950 (Fair)	650
A, 1947 (Fair)	550

DEUTZ TRACTORS

90-06, 1974 (Good)	6500*
62-04, 1976 (Good)	5500

FORD TRACTORS

3000, 1970 (Fair)	2575
4000 diesel, 1972 (Fair)	4700*
960, 1957 (Fair)	1270
901, mo., 1958 (Good)	2000*
861, ldr., 1957 (Fair)	1750*
801, 1957 (Good)	2050
800, 1957 (Rough)	950
600, ldr., 1955 (Rough)	1440
Jub., ldr., 1953 (Rough)	1375
Jub., ldr., 1953 (Fair)	1200
8N, 1952 (Rough)	1175
8N, 1952 (Rough)	950*
8N, 1951 (Good)	1525
8N, ldr., 1950 (Good)	1700*
8N, 1950 (Good)	1250*
8N, 1950 (Fair)	1000
8N, 1950 (Fair)	1000
8N, 1949 (Rough)	975
8N, 1949 (Rough)	960
8N, 1948 (Rough)	900
8N, 1948 (Good)	1175
8N, 1948 (Fair)	775
9N, 1943 (Fair)	700*
9N, 1942 (Fair)	800

INTERNATIONAL HARVESTER TRACTORS

1466 diesel, 1972 (Good)	11,500*
1466 diesel, 1972 (Good)	11,500*

(More...)

WHAT'S NEW

(Continued from page 14)

are four single-fold and three double-fold models in sizes from 31 to 51 ft., and hydraulic master and slave depth control gives uniform depth control over the entire working width.

Circle (52) on Reply Card

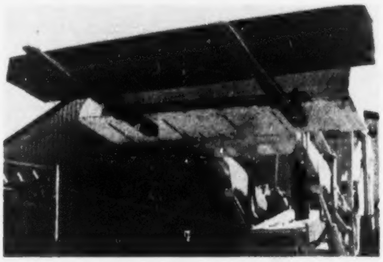
Rolling Wire Basket Fits Most Field Cultivators

The Rolling Wire Basket, from Paul Abbott Co., comes in sizes for 2, 4, 6, 8 or 12 rows and will fit most field cultivators and seedbed conditioners. There are two sets of baskets on a 2½-in. square tubular steel frame and the implement can be run with either the seven- or eight-basket set forward. The mounting brackets are spring-loaded and adjustable for desired down pressure.

Circle (53) on Reply Card

Forks Attach to Front End Loader Bucket

Jos. Dyson & Sons bucket forks allow the conversion of a front-end loader to a fork-lift truck in minutes. The forks are mounted with a clamp bar, which is secured to the wear plate of the bucket by four hex-head bolts. With this design, the weight is distributed equally over the surface of the bucket, reducing the twisting action on the wear plate and bucket. Currently available fork capacities are 4,000 to 8,000 lbs.



Circle (54) on Reply Card

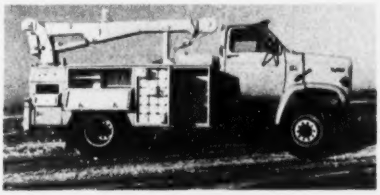
Morris Announces New Version Of Seed-Rite Hoe Drill

The new M-11 Seed-Rite hoe drill system is available in one standard working model size of 11 ft. with a true field working coverage of 11 ft., 4 in. The drill, from Morris Rod-Weeder Co., has a box capacity of 2 bu. per foot for grain and 110 lbs. per foot for fertilizer. It is also available in an all-seed box system with a grain capacity of 3½ bu. per foot. As with the former Seed-Rite system, the M-11 seeds, cultivates, fertilizes, rod weeds and packs in one operation.

Circle (55) on Reply Card

New Body Added to IMT's Service Truck Line

Iowa Mold Tooling Co., Inc. has added a low-profile C body to their mechanic's service truck line. The model has an increased load capacity due to a reduction in body weight and the compartments have a total of 115 $ft.^3$ of storage area. All of the exposed cargo area is constructed of ⅛-in. treadplate to provide better durability and footing and the body is constructed of 12-ga. steel. The body is built with a reinforced standard crane mount and IMT's hydrualic 315 crane is mounted on the unit.



Circle (56) on Reply Card

Spray Protects All Metals From Rust and Corrosion

Rust Guardit is a rust-preventative coating that dries in 30 seconds and does not contain

(More...)

Auctions (continued)

1466 diesel, 1972 (Good)	10,500*
1086 diesel, 1978 (Good)	13,500*
806, 1964 (Rough)	2800
806, 1964 (Rough)	2350*
706 diesel, 1965 (Good)	4500*
706, 1965 (Good)	2100*
504, 1965 (Fair)	2200
560, 1959 (Rough)	1800*
560, 1960 (Fair)	1625
450, 1957 (Rough)	800*
350, 1957 (Fair)	1050*
350 diesel, 1957 (Fair)	750*
300, 1957 (Rough)	1175
300, 1957 (Fair)	1000
M, 1951 (Rough)	700
M, 1950 (Fair)	900*
M, 1950 (Good)	800
M, (Rough)	550
H, ldr., 1947 (Rough)	750
Sup. A, cult., 1952 (Good)	1525
A, 1948 (Fair)	600*
A, (Rough)	575
Cub, mo., 1953 (Fair)	1120
MASSEY-FERGUSON TRACTORS	
1800, 4WD, 1974 (Good)	9000*
1100, 1967 (Rough)	3450*
1080 diesel, 1968 (Fair)	3800*
255, 1977 (Good)	5400
165 diesel, 1968 (Fair)	3800*
165 diesel, 1966 (Rough)	2800
165, 1966 (Fair)	2400*
135, 1968 (Rough)	2650*
135, 1967 (Rough)	1900*
85, 1960 (Rough)	850*
65, 1963 (Good)	1900*
65, 1962 (Fair)	1800*
65, 1962 (Fair)	1775
65, ldr., 1961 (Good)	2100
65, 1959 (Good)	1700
OLIVER TRACTORS	
2655 diesel, 1973 (Rough)	5500*
1955 diesel, 1972 (Fair)	5000*
1900 diesel, 1961 (Fair)	3300
1800, duals, 1962 (Rough)	2900*
1655 diesel, 1973 (Good)	6300
1365 diesel, 1970 (Fair)	4500*
770, 1960 (Fair)	1150
770, (Rough)	700
88, 1949 (Fair)	675*
Sup. 77 diesel, 1952 (Rough)	825
77, 1950, (Fair)	900

NOTES

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.

Prices reported are NOT averages.

Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

DEMONSTRATOR means—used for demonstrating only and in practically new condition.

RETAIL SALES OF WHEEL TRACTORS*

(In Units)

	Total Wheel Tractors†				Cumulative for Jan.-June, 1980				Cumulative for Jan.-June, 1981			
	June, 1980		June, 1981		Farm Type				Farm Type			
	Farm	Non-Farm	Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm	2-Wheel Drive	4-Wheel Drive	Total Farm	Non-Farm
Alabama	226	33	111	20	1,303	49	1,352	208	905	19	924	163
Alaska	3	2	5	10	10	6	16	13	15	1	16	30
Arizona	54	36	46	61	418	58	476	234	331	35	366	213
Arkansas	372	32	229	16	1,815	207	2,022	266	1,359	176	1,535	170
California	445	220	347	147	2,146	174	2,320	1,319	2,016	216	2,232	1,097
Colorado	132	69	96	25	524	105	629	322	504	109	613	229
Connecticut	34	15	20	13	143	3	146	100	91	2	93	72
Delaware	14	2	9	1	92	5	97	17	63	2	65	12
Florida	261	79	167	78	1,199	32	1,231	585	1,114	25	1,139	543
Georgia	304	52	189	40	1,731	30	1,761	257	1,276	14	1,290	276
Hawaii	9	5	5	3	33	1	34	55	32	4	36	40
Idaho	125	13	130	6	515	61	576	76	704	122	826	75
Illinois	480	86	384	56	2,515	396	2,911	401	2,199	387	2,586	353
Indiana	320	31	268	15	1,497	244	1,741	250	1,257	188	1,445	178
Iowa	356	16	372	25	2,813	290	3,103	157	2,772	328	3,100	119
Kansas	451	30	265	8	1,623	377	2,000	188	1,114	242	1,356	144
Kentucky	502	72	274	17	2,212	41	2,253	250	1,809	27	1,836	223
Louisiana	321	56	202	47	1,427	146	1,573	310	1,372	124	1,496	360
Maine	26	4	22	7	108	2	110	52	123	3	126	36
Maryland	66	35	41	18	383	25	408	161	267	15	282	182
Massachusetts	18	27	25	24	69	.....	69	128	82	.....	82	133
Michigan	301	59	215	53	1,183	126	1,309	398	1,209	189	1,398	332
Minnesota	357	43	290	18	1,855	309	2,164	215	2,049	319	2,368	151
Mississippi	365	57	196	20	1,820	150	1,970	192	1,282	101	1,383	150
Missouri	399	40	315	26	2,003	134	2,137	305	1,570	145	1,715	227
Montana	140	22	105	11	576	150	726	114	425	133	558	73
Nebraska	297	20	203	23	1,737	208	1,945	91	1,403	150	1,553	78
Nevada	11	17	.....	11	60	8	68	68	43	6	49	61
New Hampshire	26	10	19	8	71	.....	71	40	54	.....	54	45
New Jersey	26	46	17	46	157	1	158	238	114	.....	114	223
New Mexico	44	24	30	15	235	13	248	113	176	19	185	120
New York	343	68	232	77	1,235	57	1,292	442	1,111	87	1,198	376
North Carolina	260	60	170	49	1,776	28	1,804	322	1,353	26	1,379	276
North Dakota	128	16	157	13	685	393	1,078	71	877	417	1,294	43
Ohio	363	89	280	65	1,915	192	2,107	434	1,534	196	1,730	347
Oklahoma	401	50	266	62	1,261	190	1,451	282	1,026	135	1,161	356
Oregon	198	23	120	14	665	40	705	194	569	54	623	158
Pennsylvania	292	88	153	61	1,151	35	1,186	520	965	37	1,002	429
Rhode Island	3	5	3	2	9	.....	9	26	13	.....	13	18
South Carolina	146	36	103	37	860	26	886	169	565	15	580	180
South Dakota	109	4	89	6	722	120	842	47	617	122	739	34
Tennessee	352	37	236	32	1,697	51	1,748	196	1,366	33	1,399	166
Texas	998	297	833	323	4,713	295	5,008	1,786	4,338	249	4,587	1,799
Utah	99	32	58	24	331	17	348	163	329	17	346	143
Vermont	52	3	36	3	148	.....	148	16	150	2	152	26
Virginia	272	31	133	16	1,194	18	1,212	289	809	11	820	206
Washington	212	24	142	59	913	85	998	228	707	95	802	211
West Virginia	88	15	30	12	271	.....	271	106	170	.....	170	68
Wisconsin	617	42	432	38	2,421	111	2,532	237	2,190	135	2,325	209
Wyoming	32	16	17	7	164	20	184	83	186	18	204	89
U.S. Government	19	27	2	10	70	.....	70	383	8	.....	8	47
Miscellaneous‡	12	3	18	2	190	.....	190	364	115	.....	115	315
TOTAL	**11,481**	**2,220**	**8,107**	**1,780**	**54,664**	**5,029**	**59,693**	**13,482**	**46,728**	**4,750**	**51,478**	**11,606**

Data released August 21, 1981, Farm & Industrial Equipment Institute.

*Figures do not include garden tractors, motor tillers or contractors off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland Satoh), Allis-Chalmers; Belarus; J I Case; Deere; Deutz; Ford; International Harvester; Long; Massey-Ferguson; R. M. Wade (Satoh); Steiger; Versatile; and White.

†The monthly sales are those reported for that month only. The cumulative totals are subject to revision reflecting updating in the basic sales data.

‡Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.